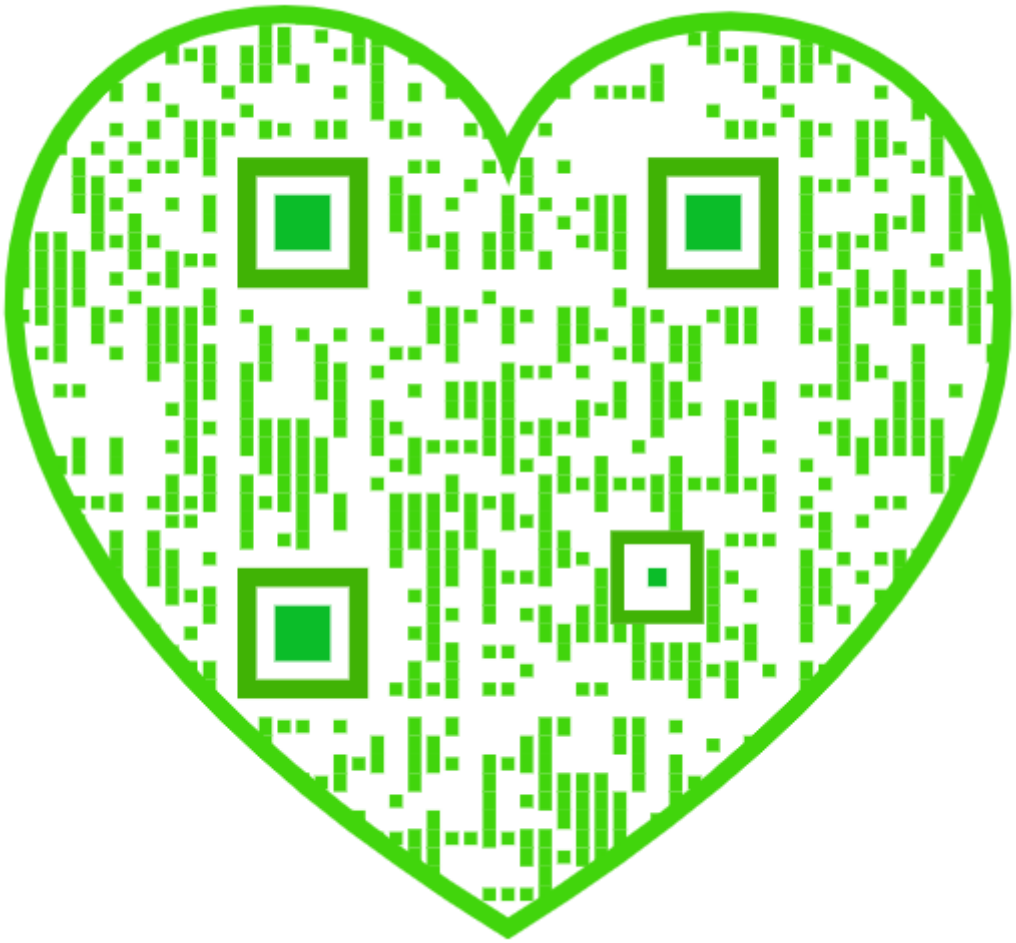

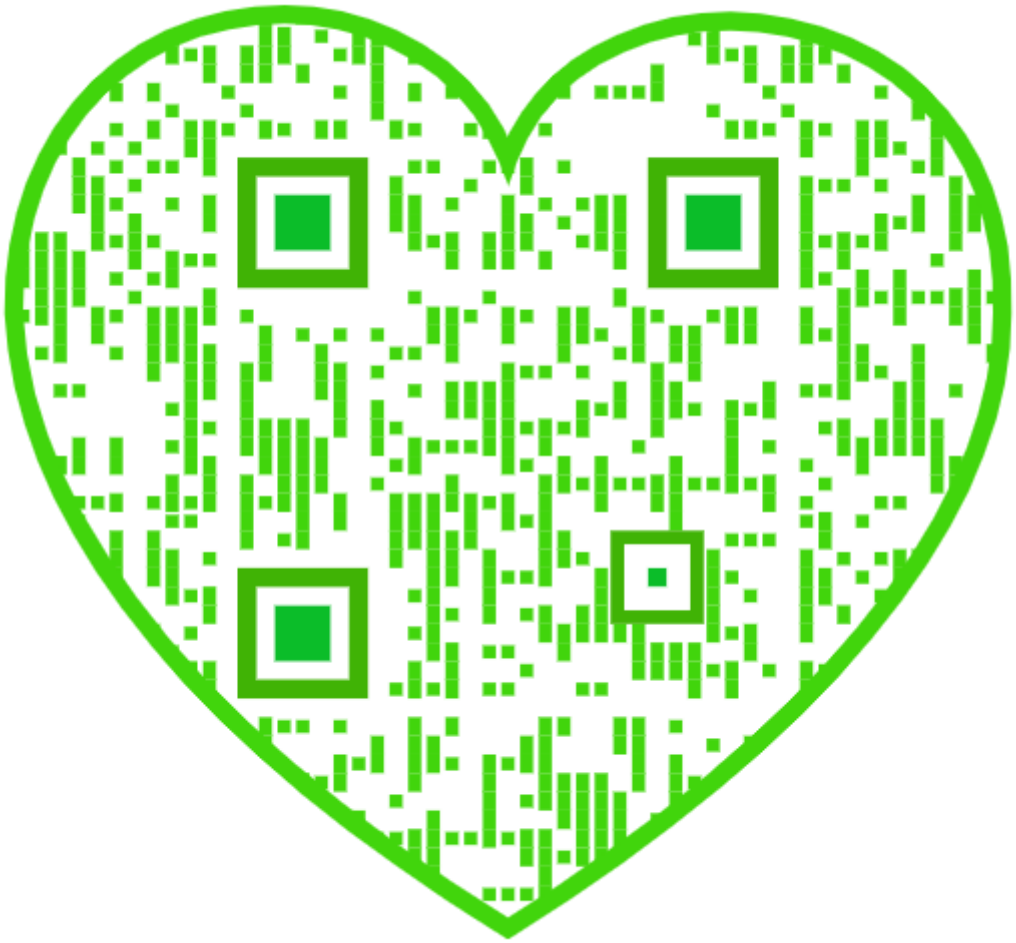

THE WEATHER GUIDE-BOOK.

THE

WEATHER GUIDE-BOOK,

A

CONCISE EXPOSITION

OF

ASTRONOMIC-METEOROLOGY.

BY

ALFRED J. PEARCE.

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PREFACE.

What is *Astronomic* Meteorology? will be the question suggested by the title of this work. Before answering it directly, I cannot do better than quote Sir John Herschel's definition of Meteorology:—

"METEOROLOGY, which, in its ancient and etymological sense, included all the appearances of the heavens, as well astronomical as atmospheric, is at present restricted in its meaning to the description and explanation of those phenomena which group themselves under the heads of the weather, of the seasons, and of climate—phenomena, which scientifically regarded, are referable almost entirely to the agency of those laws which govern the ever-varying affections of the atmosphere of our globe in its relations to heat, moisture, and electricity, and the movements which the changes of those relations, brought about by astronomical or other causes, impress upon its parts."

The prefix "*Astronomic*" is used in order to denote that "*astronomical* causes" form the basis on which this theory is founded. In other words, that the constant recurrence of certain changes in the state of the atmosphere, and variations of weather, in coincidence with certain relative positions of the Earth, Sun, Moon, and *planets* (Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune), has led to the inference that these coincidences are referable to '*cause and effect.*'

The prefix "*Astro*" is also used to distinguish this particular theory from Meteorology *pur et simple*—*i.e.* in the present acceptation of the term.

Much prejudice exists against Astro-Meteorology. It has been suggested to me that the probable cause of the greater part of this prejudice is attributable to an idea—said to be very prevalent—that this weather-theory is a branch of the ancient *astrology*.

Astro-Meteorology is altogether distinct from Astrology. The former science is based upon the theory, which will be hereafter

explained more fully, that the planets act upon the atmosphere of the Earth in such a manner as to induce changes of weather; while astrology is based upon a theory of planetary influence—physical and psychical—on *ourselves*. It would be as reasonable to discard *Astronomy* as Astro-Meteorology, because of its former connection with astrology—for the terms (astronomy and astrology) were until lately, synonymous. It were as reasonable to reject *Chemistry* because it had its origin in *Alchemy*. Let our scientific men examine Astro-Meteorology, and adopt it if it be demonstrated to be *truth*, but let them not argue that the adoption of it necessitates the recognition of Astrology.

An objection urged by Mr. Saxby escaped my attention when writing the first chapter of this work. This objection is contained in the following paragraph:—

"I would first plainly declare, that I do not, nor did I ever, believe in *Astro*-Meterology. The laws of gravitation apply, of course, to all space as a universal law, but it is not difficult to demonstrate that its effect on the planets as parts of the Solar system is quite another thing in amount from their effect on our Earth's atmosphere. Believers in *astro*-meteorology fall into the error of estimating the *bulk*, and not the specific gravity of celestial bodies. It is obviously of importance, for instance, to consider whether a planet has the specific gravity of our earth or of cork! or whether the distance be one quarter of a million of miles from us, as the Moon is, or as in the case of Jupiter, nearly five hundred millions of miles! with, moreover, the fact that attraction decreases inversely as the cube of the distance!"

It is not the *Earth* on which Jupiter acts, but the *atmosphere;* therefore it does not matter what the *specific gravity* of Jupiter may be, compared to that of the Earth. The chemical action of Jupiter's rays has been proved to be *fourteen times greater than that of the Moon's rays;* consequently, the objection as to the *distance* of Jupiter from the Earth compared to that of the Moon falls to the ground. Jupiter's action on our atmosphere is, probably, *electric*. The amount of *ozone* in the atmosphere is, usually, very great under Jupiter's influence, as for instance, from

the 17th to the 24th of March, and from the 9th to the 16th of May, 1864, when the mean quantity of ozone was at the *maximum*.

The extraordinary heat of May, 1864, was due to the Earth passing between the Sun and Jupiter (*i.e.* the Sun in *opposition* to Jupiter) on the 13th, and the Earth forming the angle of 120 degrees with Mars and Jupiter on the 17th of May. Again, the remarkable coincidences of extreme heat in May, 1833, in April, 1840, and in May, 1848, with similar relative positions of Mars, Jupiter, and the Sun (*vide* pp. 47, 48, and 49) are sufficient of themselves to establish the influence of these bodies. If it can be proved by an appeal to facts, fairly collated, that these coincidences were *accidental*—if the balance of testimony be against Astro-Meteorology, I shall be happy to renounce my faith in it. My only object is the establishment of *truth*. Let my readers cast away prejudice, and consider that the seeking after *truth* and the contemplation of the CREATOR'S laws, must be pleasing in HIS sight. Let them bear in mind the opinion of truth-seekers expressed by the Rev. Canon Stanley in the following beautiful language, extracted from a sermon delivered at Westminster Abbey, on Sunday evening, April 3rd, 1864:—

"If there were any present who have devoted themselves to science; if there were any there who were students, in any sense, of science in nature, science in language, science in history, and science in theology—if there were any in whom *truth* seemed to be the leading pole-star of their lives, be they there, or be they far away from church or abbey, they were, consciously or unconsciously, willingly or unwillingly, labouring in the service of Him who is 'the truth.'"

The pursuit of the science of Meteorology is, necessarily, a labour of love. How many precious lives would be saved, how many homes would remain happy, instead of being made desolate, if the approach of the tempest could be foreseen!

I have often been asked why I do not write to the *Times* on Astro-Meteorology. I have done so repeatedly, but none of my letters have appeared. A similar fate has befallen letters to the *Daily Telegraph* and to the *Standard**.

* The *Standard* did print *one* of my letters in Oct. 1863.

Doubtless the 'pressure of important matter'—such as 'glowing' accounts of dog-shows, horse-shows, projected donkey-shows, *et hoc genus omne*—has precluded the possibility of a small portion of 'valuable space' being granted for such *un*-important matter as the ventilation of a weather-theory, which, if adopted and acted on, would prevent many 'disasters at sea,' much spoliation of hay and corn, and the interruption of pleasant pic-nic parties by untoward weather.

To the Editor of the *Northampton Mercury* I desire, thus publicly, to offer my warmest thanks for his impartiality and kindness manifested by the publication of my letters during a period of two and a half years.

Astro-Meteorology is yet far from perfect. It has, however, been much improved and advanced by my friend R. J. Morrison, Esq., Commander, R.N.—a veteran astro-meteorologist. To this gentleman Astro-Meteorologists are indebted for the discovery of the influence of Uranus on the weather I am, personally, indebted to Capt. Morrison for a valuble treatise *On the Cause of Rain* (*vide* pp. 87-89).

I wish that an abler pen than mine had undertaken the task which has devolved upon me. With the imperfect means at my disposal (not possessing an observatory) I have done what I can to forward the cause of Astro-Meteorology—which I believe, for the reasons given in this work, to be *the true weather-theory*, and the only one which will bear the severe test *of comparison with recorded facts*.

If the publication of this treatise should lead to the examination and adoption of Astro-Meteorology by scientific authorities and by the public, my object will be attained.

A. J. P.

London,
July 5th, 1864.

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CHAPTER I.

METEOROLOGY.

It has been stated that, "Meteorology, so far as prediction of the weather is concerned, may be regarded as a science still in its infancy." Although Claudius Ptolemy wrote treatises on "*Particular constitutions of the atmosphere*," "*the signification of meteors*," and rules for predicting atmospherical disturbance, in his *Tetrabiblos*, published 1724 years ago; and the attention of scientific men in all ages has been, more or less, directed to observations of the weather, with the object of discovering laws regulating changes of temperature, floods, drought, storms, &c., the *savans* of the nineteenth century are still unable to understand the operations of those laws, and consequently avow their inability to predict atmospherical variations more than twenty-four hours in advance with any degree of certainty. It is lamentable that such should be the case, while other sciences have undergone such vast and rapid improvement. This may be partly accounted for by the fact, that until the last two or three years meteorology has not been a *popular* science: and assuredly so long as it is left in the hands of a *few* it will make little progress. The ingenuity and interest of the *people* must be awakened, so that those of our learned and scientific men who devote their time and energies to this science may be urged to examine fairly every weather-theory. Many of the greatest discoveries in science have been made by men unlearned in the

higher branches of knowledge—men whose minds had not been trammelled by being taught to reason only in a particular vein—men whose independence of thought and opinion, and whose moral courage, have enabled them to battle against prejudices and impossibilities falsely so-called. We want men who are not prejudiced in favor of *dogmas* laid down in the spirit of the laws of the Medes and Persians — never to be altered; we want the originality of the independent mind brought to bear upon that science which has been declared to be "one of the most desperate with which we have to deal."*

Admiral Fitz Roy by means of his "forecasts," Sir John Herschel by his writings, and a few other gentlemen who occasionally keep alive the public interest by letters to the *Times*, have rendered important aid to the science by making it popular. And it is to be deeply regretted that there have been found some gentlemen who have exhibited a spirit unworthy of the present age, by opposing the grant of £4000 per annum to the Meteorologic Office of the Board of Trade. By so doing they are extinguishing the little spark of vitality which has been called into existence and nourished by Government patronage and popular support.

Would that our scientific men—those who have large brains and large hearts, and in whom are combined the natural simplicity of genius and the erudition of scholars—could be induced to examine astronomic-meteorology fairly and impartially! And should they be convinced by every day evidence, deduced from their own observations, that this science is based upon truth—that the planetary bodies *do* act on our atmosphere in such a manner as to induce changes of temperature and determine the force of the wind—may they bring their talents to bear upon

* At a Meeting of the British Association, when Admiral Fitz Roy read a paper "On Aqueous Vapours and Atmospheric Waves;" the Astronomer Royal made some remarks on the paper, observing that "inquiries had only served to throw obscurity on the subject. Indeed, he regarded the science of Meteorology as one of the most desperate with which we have to deal."—*Morning Star*, Sept. 19th, 1859.

the present state of the science, and so eliminate any errors that may exist. Then by their ingenuity and perseverance they would discover further and more extended laws. By so doing they would deserve and receive those rewards which ever attend the labours of those who confer lasting and incalculable benefits upon their fellow-beings, by bringing them to a better understanding of their CREATOR's laws; and foreseeing, under His divine blessing, the periods when the devastating storm will sweep the ocean and the main-land, and thus partially, if not entirely, preventing the sacrifices of life and property by which it is so often accompanied.

THE THEORY OF ASTRONOMIC OR PLANETARY METEOROLOGY.

THE theory of Astro-Meteorology was so well described in the *Record* of the Astro-Meteorological Society that we think it well to extract the following paragraphs:—

"It will suffice, by way of explaining the principles of the "science, to state that they depend on the circumstance that "certain of the heavenly bodies are *always* found in certain "relative positions — chiefly as regards the Sun — when there "are observed peculiar features in the atmosphere; that is to "say, that certain celestial bodies are found in the same posi-"tions when excess of heat, or drought, abounds; and other such "bodies are observed to return to certain similar positions when "cold, rain, hail, thunder, or storms of wind are found to prevail. "From whence, two things have been inferred; First, that the "said positions of those celestial bodies are the original, although "not the proximate, causes of the atmospheric phenomena. "Secondly, that since the periods at which those celestial posi-"tions occur may always (except in the case of comets) be accu-"rately calculated, for years beforehand, it is possible and easy

"to foreknow the periods concurrent therewith, at which those "atmospheric phenomena will also take place.

"Every Astro-Meteorologist—pity it is there are so few— "believes and knows, that when planets form certain angles with "the Sun and our Earth, certain known influences are the result; "and those influences appear to arise from the light reflected "from each planet into our atmosphere, which light acts chemi- "cally or electrically, according to its nature*. For instance, "Mars reflects only the red ray of light. It is a well-attested fact "that *light* and *heat* both exist in the atmosphere, and that the "latter is but a modification of the former. It is also a well- "attested fact that the component parts of the atmosphere— "when brought in contact in given proportions, and fired by "the electric spark, produce *perfect light;* and also, that *oxygen*, "the *red ray* of solar light and *positive electricity*, are *identical;* "and that the *blue ray* of light, or *nitrogen*, is equivalent to *nega- "tive electricity*."

"It may here be asked, *why* should there be any force, virtue, "or potency in these particular angles, that should cause effects, "either on the temperature or any other state of the atmos- "phere, to appear when the heavenly bodies form among each "other these particular angles? The proper reply to this question "is to ask the interrogator another: why is one of these angles, "that of 60 deg., or the *sextile*, that at which *water* crystallizes? "If we are asked *why* the temperature *rises* when the planet "Venus forms an angle in the heavens with Jupiter of 60 deg., "and does not rise when these two planets form an angle of "65 deg.—we will answer the question so soon as the interrogator "tells us why water does not crystallize at an angle of 65 deg., "but always does at an angle of 60 deg. In both cases the *fact* "is known, but in neither can the reason as yet be given. It "would be as unreasonable to deny the fact in one case as in the "other, merely because the reason has not yet been discovered.

* This opinion was given in No. II of the *Record*, published in April 1861, one month *before* the result of the experiments with the rays of Jupiter had been published in the *Monthly Notices* of R. A. Soc.

"We may add, that these angles are to be computed in the "ecliptic; thus, when the longitude of the Sun is 25 deg., and "that of Mars is 85 deg., they are at an angle of 60 deg. distance "from each other; they then are said to be in sextile aspect, and "in such cases the temperature is found to *rise*. So when the Sun "is in 50 deg. of longitude, and the planet Saturn is in 140 deg., "they are 90 deg. apart, or in square aspect; and on these occa- "sions the temperature *falls*."

As to the *modus operandi*, we do not yet understand how it is that the heavenly bodies act upon our atmosphere. We *believe* that their light acts by chemical and electrical processes which may be by constant observation eventually understood and explained. And we are strengthened in this belief by the statement, that "out of an equal quantity of light incident upon "the two bodies, *Jupiter* reflects fourteen times more of the "chemical rays than the Moon does" [*Monthly Notices* of Royal Astronomical Society, May 10th, 1861]. Here we have evidence that the rays of Jupiter, after passing through forty miles of gases of which our atmosphere is composed, act chemically with *fourteen times* greater power than do those of our satellite.

The objection has been made that "the quantity of light afforded us by Jupiter is so microscopic, that the proportion of chemical rays accompanying it can matter little, so far as any sort of terrestrial work goes." The answer to this argument would be—if Jupiter can act "through forty miles of gases" on the surface of our Earth, he does, probably, increase the amount of electricity, and of ozone. La Place in his "Essai Philosophique sur les Probabilités," says:—"We are so far from knowing all "the agents of nature, and their different modes of action that "it would be unphilosophical to deny the existence of phenomena, "*because* they are inexplicable in the present condition of human "knowledge; we ought to examine them with more attention, if "it appears difficult to admit that they exist; and it is here, that "a calculation of probabilities becomes indispensable, in order to "determine how far we should multiply our observations and

"experiments, so as to obtain evidence in favor of a probability, "which may be superior to our arguments against it."

The following objection has also been given to the author:—"The striking of St. Paul's clock may be followed 20,000 times by the departure of an omnibus for Putney; but it may be presumed no astro-meteorologist would consider the striking of the clock the cause of the starting of the omnibus." Now the philosophical *law* of coincidences is this, viz:—that *all* coincidences, when they are sufficiently frequent to be removed from the confines of chance, prove that the two things that coincide are either "cause and effect," or are "the effects of a common cause." The striking of St. Paul's clock and the starting of the Putney omnibus being always coincident, proves "the effect of a common cause;" viz. the revolution of a portion of time, on which both depend. Then if we are able to shew that certain characteristics of the weather *always* coincide with certain positions of the planetary bodies, we shew the *law* of connection, before described.

The planets — Uranus, Saturn, Jupiter, Mars, Venus, and Mercury—are found to be *most* potent when they are on the Equator (in other words, crossing the line); when at their extreme declinations; when in conjunction with, and in opposition to the Sun (analogous to *new* and *full* Moon); and when at 90 degrees distance from that body (answering to the Moon's *quarters*). [N.B. Venus is never more than 48 deg. and Mercury is never more than 28 deg. distant from the Sun].

The last three 'positions' are called 'aspects'.

Besides these three, there are eight other relative positions, which are also called 'aspects,' viz:—the 12th, 10th, 8th, 6th, 5th, 3rd parts of the whole circumference of a circle, or 360°, and the *supplements* (i. e. differences from 180°) of the 8th and 10th parts. These eight aspects accordingly are 30°, 36°, 45°, 60°, 72°, 120°, 135°, and 144°.

In addition to these 11 aspects, the distance of 150° (i. e. the supplement of the 12th part) has been recommended for observation.

Of the aspects, the following have received certain names and symbols to express them, thus:—

Conjunction (when two bodies have the same longitude) . . .	expressed by	☌
Opposition (when the difference of longitude of two bodies is 180°) . .	„	☍
60°, named *sextile*	„	⚹
90°, named *square*, or *quartile* . .	„	□
120°, named *trine*	„	△

Two bodies are said to be 'in equal declination' (eq. dec.) when their declinations, and therefore their polar distances, are equal in magnitude.

Influence is found to be exerted by the planets, when their position appears to be *stationary*.

The heavenly bodies are symbolized, for the sake of brevity, thus:—

☉ The Sun	♂ Mars
☽ The Moon	♃ Jupiter
☿ Mercury	♄ Saturn
♀ Venus	♅ Uranus
⊖ The Earth	♆ Neptune.

The signs of the Zodiac are expressed thus:—

Northern	♈ Aries	Southern	♎ Libra
	♉ Taurus		♏ Scorpio
	♊ Gemini		♐ Sagittarius
	♋ Cancer		♑ Capricornus
	♌ Leo		♒ Aquarius
	♍ Virgo		♓ Pisces.

A. The Sphere.

The *sphere* (or *globe*) is a solid figure bounded by one *surface*, such that all straight lines drawn from points in the surface to a fixed point within the surface are equal to one another.

The fixed point within the surface is called the *centre* of the sphere.

The straight lines drawn from any point in the surface to the centre are called *radii* of the sphere. They are all of the same length. This length is called the *radius* of the sphere.

All straight lines drawn through the centre to meet the surface both ways are called *diameters*. They are equal in length, being each twice the length of the radius.

If any plane cut the sphere, the line whose points are both in the plane and in the surface of the sphere, is called a *section* of the sphere.

All sections of a sphere made by planes are *circles*.

If the cutting plane passes through the centre of the sphere, the section is a *great circle;* if it does not, the section is a *small circle.*

All *great circles* are equal to one another. The *centre* of each coincides with the centre of the sphere, and the *radius* of each is the same as the radius of the sphere.

Any two great circles cut one another in a common diameter, which is also a diameter of the sphere. This divides each of them into two *semicircles.*

All *great circles* are divided into 360 equal portions, each of which is called a *degree* (°). Each *degree* is divided into 60 equal portions called *minutes* (′). Each *minute* is divided into 60 equal portions called *seconds* (″).

If a diameter of a sphere be drawn perpendicular to a great circle, its two extremities (where it meets the surface of the sphere) are called the *poles* of the great circle.

Every great circle drawn through the poles of a great circle cuts this great circle at right angles. The distance (measured along the cuttting great circle) of either pole from the great circle is always the same. It is a *quadrant*, or a quarter of the circumference of a great circle. It therefore contains 90°.

Two great circles intersecting one another, as we have said, bisect each other into semicircles. If a third great circle be drawn through the poles of each, this last one (besides cutting them at right angles) will bisect each of the constituent semicircles into two *quadrants.* And the portions of it included

between the two great circles are each equal to the portion of the cutting great circle included between the two different poles. This distance also measures the inclination between the planes of the two great circles.

B. *How the position of a point on the surface of a sphere is determined with reference to a great circle, and a given point in the same.*

A great circle being given, its two poles are known. A certain point in this circle is chosen: it is called the origin.

Now suppose there is a certain point on the surface of the sphere, whose position we wish to determine or register down.

Draw a great circle through both poles of the given great circle and this point. It will, of course, cut the latter great circle at right angles in a certain point; and this point is at a certain distance from the point, whose position we wish to determine, measured along the cutting great circle towards one or other of its two poles.

These two distances (measured in degrees, &c.) determine the position of the point:—

1°. The distance of the origin from the point, where the cutting great circle cuts the given great circle of reference, measured from 0° to 360° in a given direction (as from left to right) along the given great circle.

2°. The distance from the point where the cutting great circle cuts the given one of reference of the point to be determined, measured towards one or other of the poles (which has to be mentioned)—the upper or under—along the cutting great circle, and varying from 0° to 90°.

The 1st distance may be called the *abscissa*, and the 2nd the *ordinate*. The *abscissa* varies from 0° to 360°: the *ordinate* is either *upper* or *under*, and varies from 0° to 90°.

C. *On the different practical uses of the general method of* B.

The general system developed in B can be particularized by the choice of two data (1) *the great circle of reference* (2) the

origin in the same. The *abscissa* and *ordinate* of the point in the sphere's surface receive different names, according to the selection of (1) and (2). There are three principal systems of *abscissæ* and *ordinates* in Astronomy, dependent on the choice of a great circle for reference and of the point on this last great circle for origin.

D. *The celestial sphere.*

To an observer on the Earth's surface, every heavenly body, at any given time, appears to be situated in the surface of a sphere of which his eye is the centre.

On account of the smallness of the Earth's radius, the centre of this sphere can without error be supposed removed to the centre of the Earth.

This sphere is the celestial sphere.

It is concentric with the Earth—the centres of the Earth and the celestial sphere being the same.

E. *On certain great circles, and their poles, in the celestial sphere.*

1°. If an observer stand on the Earth's surface, and a straight line be drawn from the centre of the Earth to him: then the two points in which this straight line if produced upwards and downwards cuts the celestial sphere, are called *his* "*Zenith*" and *his* "*Nadir*," and that great circle of which these two points are the poles, is called *his* "*Horizon.*"

2°. The heavenly bodies appear to an observer on the Earth to traverse the celestial sphere in circles once in a fixed time (called a sidereal day, and equal to $23^h\,56^m\,4\cdot1^s$ mean solar time) round a certain fixed axis (coincident with that of the Earth) in a direction which we call from east to west. This fixed axis being produced cuts the celestial sphere in two points—which are called the North Pole and South Pole respectively.

That great circle of the celestial sphere, of which these two points are the poles, is called the *Equator.*

3°. To an observer at the Earth's surface, the centre of the Sun revolves from east to west once in a sidereal day.

Yet it does not do so in the same manner as the fixed stars. Their apparent daily motions may be represented by their having a fixed position in the celestial sphere, and by this sphere revolving from east to west about its axis. Each of them therefore moves exactly in a circle during the sidereal day, and in the same circle every day alike. With the Sun's centre this is not the case; nor is it with the Moon and planets either. To speak of the former, its apparent daily path is not exactly a circle, though without error we may conceive it such; and then, also, it is a different circle from day to day during each year. It has, we say, a *proper* motion as well as the daily one caused by the revolution of the celestial sphere from east to west. Observations shew this proper motion to be of the following nature:—The Sun's centre during the period of time we call a year moves quite through a great circle of the celestial sphere, inclined at a fixed angle to the great circle we call the equator; and then this annual proper motion combined with the daily motion (produced by the revolution of the celestial sphere) produces the irregularities alluded to in the apparent daily path of the Sun's centre.

Now this great circle, which the Sun's centre moves through during the year, is called the *Ecliptic.*

The Ecliptic intersects the Equator in two points. These two points are a semicircle, or 180° distant, from each other—whether their distance be measured along the Ecliptic, or along the Equator. They are called respectively the "first point of Aries" (♈), and the "first point of Libra" (♎).

The Ecliptic has two poles, like the Equator, and every other great circle. As we have seen above, if a great circle be drawn passing through the poles of the Equator and the Ecliptic, it must cut each of them at a distance of 90° from their points of intersection, i. e. the first points of Aries and Libra; and either portion of it that is intercepted between these great circles must be equal to the distance of their neighbouring poles. This great circle is called the *Solstitial Colure*, and either of its intercepted portions (equal to the distance between the neighbouring

poles of the Equator and Ecliptic, and also to the inclination between the planes of these great circles) is called the *Obliquity of the Ecliptic.*

In strict accuracy neither are the first points of Aries and Libra fixed points, nor is the Obliquity a constant quantity.

The first point of Aries (and therefore that of Libra) recedes along the Ecliptic about 50″.5 in the year. The Obliquity suffers a mean annual diminution of 0″.476, and its value on January 1st, 1864, was 23° 27′ 25″.17.

We proceed next to explain the different systems of registering the positions of the heavenly bodies.

F. *On Azimuths and Altitudes.*

If the *Horizon* of an observer be taken as the great circle of reference, either point where the great circle drawn passing through the Zenith and the North (or South) Pole cuts the Horizon can be chosen as the origin.

The abscissa of any heavenly body, whose position is thus referred, is called its "*azimuth*:" and its ordinate is called its "*altitude*."

G. *On Right Ascensions and Declinations.*

If the *Equator* be taken as the great circle of reference, the first point of Aries is chosen as the origin.

The abscissa of any heavenly body, whose position is thus referred, is called its "*right ascension*" (R. A.); and its ordinate is called its "*declination*" (dec.).

The R. A. varies from 0 to 360°, and is measured from the first point of Aries in the direction of west to east. The declination varies from 0 to 90°, and is either upper or under, i. e. north or south.

H. *On Longitudes and Latitudes.*

If the *ecliptic* be taken as the great circle of reference, the first point of Aries is chosen as the origin.

The abscissa of any heavenly body, whose position is thus

referred, is called its "*longitude*" (long.); and its ordinate is called its "*latitude*" (lat.).

The longitude varies from 0 to 360°, and is measured from the first point of Aries in the direction of west to east. The latitude varies from 0 to 90°, and is either upper or under, i. e. north or south.

I. *On the Longitude and Latitude of the fixed Stars.*

The fixed stars have always the same position on the celestial sphere.

Their latitude is consequently always the same; but their longitude increases at the rate of $50\frac{1}{2}''$ in the year, on account of the motion of the first point of Aries.

J. *On the Longitude and Latitude of the Sun, Moon, and Planets.*

The Sun, Moon, and planets are always changing their position on the celestial sphere.

On account of these proper motions that they have, their latitudes vary from time to time; and so do their longitudes also, (irrespectively of the variations caused in these last by the motion of the first point of Aries).

K. *On the Right Ascensions and Declinations of the fixed Stars, and of the Sun, Moon, and Planets.*

The observations made in I and J with regard to the longitude and latitude can equally be predicated of the R. A. and declination of the two classes of heavenly bodies.

L. *On the proper motion of the Sun's centre.*

Since the path of the Sun's centre is the Ecliptic itself, it is plain that the Sun's centre can have no latitude, but a longitude only. This longitude varies from 0 to 360°—being 0 at the time of the *Vernal Equinox* when the Sun's centre coincides with the *first point of Aries*, and increasing up to 360°, which value it

reaches after the lapse of a year at the time of the next vernal equinox.

The Sun's centre has both a R. A. and declination, which vary in magnitude during the course of the year.

Our following remarks will be rendered easier to understand by a perusal of the ninth and two last paragraphs of A.

The Sun's longitude is 0 at the time of the *Vernal Equinox.* He is then *in the first point of Aries*, and is crossing the equator from south to north. His R. A. is zero, and his declination is zero likewise.

As his longitude increases from 0 to 90°, the Sun is moving in the Ecliptic on the north side of the Equator. His R. A. goes on increasing, as well as his declination, which is north. When the Sun's longitude is 90°, he is at that point of the Ecliptic where it is cut by the Solstitial Colure north of the Equator. This point is the *first point of Cancer*, and the time of the Sun's being there is the *Summer Solstice.* His R. A. is 90°; and his declination is equal to the Obliquity, and attains its highest value north.

As his longitude increases from 90° to 180°, the Sun continues on the north side of the Equator. His R. A. goes on increasing, but his declination, which is still north, decreases from its highest value north. When the Sun's longitude is 180°, he is at that point of the Ecliptic where it is cut by the Equator opposite to the first point of Aries, and is crossing the Equator from north to south. This point is the *first point of Libra*, and the time of the Sun's being there is the *Autumnal Equinox.* His R. A. is 180°, and his declination is zero, since he is then crossing the equator.

As this longitude increases from 180° to 270°, the Sun is on the south side of the Equator. His R. A. goes on increasing, as well as his declination, which is now south. When the Sun's longitude is 270°, he is at that point of the Ecliptic, where it is cut by the Solstitial Colure south of the Equator. This point is the *first point of Capricorn*, and the time of the Sun's being there is the *Winter Solstice.* His R. A. is 270°; and his decli-

nation is again equal to the Obliquity, and attains its highest value south.

As his longitude increases from 270° to 360°, the Sun continues on the south side of the Equator. His R. A. goes on increasing, but his declination, which is still south, decreases from its highest value south. When the Sun's longitude is 360°, he is again after the lapse of a year at the *first point of Aries*, and is crossing the Equator from south to north. It is again the *Vernal Equinox:* his R. A. is 360°, and his declination is zero.

After this exactly the same changes follow for each succeeding year as we have described.

M. *On the proper motions of the Moon and Planets.*

The Moon and planets have proper motions as we have said. These give rise to changes both in their longitude and latitude, and in their R. A. and declination.

The proper motion of the Moon is in a plane, cutting the Ecliptic, and inclined to it at an angle of about 5°. The points where this plane cuts the Ecliptic are called the Moon's *ascending and descending nodes.* When she is in either node, her latitude is zero: midway between them, her latitude is about 5°, either north or south. The changes in the Moon's latitude and longitude, and her R. A. and declination (owing to her proper motion) recur in a period of a lunar month, or 28 days.

N. *On the difference of longitude of two heavenly bodies.*

Two heavenly bodies have either the same longitude, or else different longitudes.

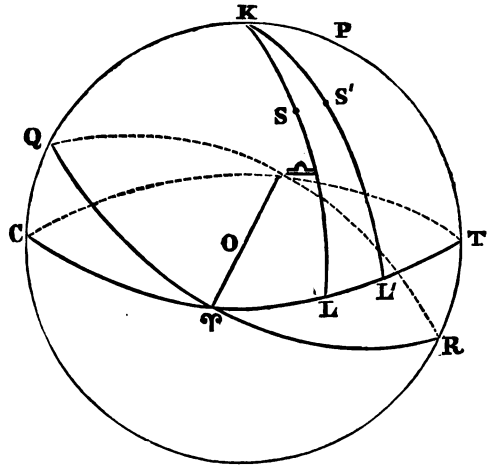
If they have the same longitude, their *difference of longitude* is *zero.*

If they have different longitudes, their *difference of longitude* is the remainder left after subtracting the less longitude from the greater one.

Since the longitude of any heavenly bodies varies from 0° to 360°, the difference of longitude of two heavenly bodies may

have all values from 0 to 360°. But if this difference exceed 180°, we subtract 180° from it, and regard the remainder as the difference of longitude required.

We have inserted the accompanying figure with a view of making our text clearer.



The figure represents the celestial sphere, whose centre O is the centre of the Earth. The great circle C ♈ T is the Ecliptic; K is one the poles of the Ecliptic. The great circle Q ♈ R is the Equator: P the north pole of the Equator.

K and P have been taken both in the plane of the paper:—so that the great circle Q K P is the Solstitial Colure, and C Q, T R, K P are each equal to the Obliquity.

♈ O ♎ is the line of intersection of the planes of the Ecliptic and Equator, passing through O. ♈ is the first point of Aries. ♎ is the first point of Libra. Also T, C are respectively the *first points of Cancer and Capricorn.*

S, S′ are any two heavenly bodies on the surface of the celestial sphere.

Through K the pole of the Ecliptic and through S and S′ draw

great circles K S L, K S′ L′ so as to meet the Ecliptic C ♈ T in L and L′.

Then ♈ L is the longitude of S, and ♈ L′ that of S′. Also S L is the latitude of S, and S′ L′ that of S′.

Since ♈ L′ the longitude of S′ is greater than ♈ L the longitude of S, we subtract ♈ L from ♈ L′. The remainder L L′ is the *difference of longitude of S and S′*.

If S and S′ happen to be both on the same great circle passing through K, K S′ L will coincide with K S L, and the difference of longitude L L′ is zero.

Should L L′ be greater than 180° or a semicircle, a semicircle is subtracted from it, and the remainder called *the difference of longitude*.

O. *On certain differences of longitude called "aspects."*

Certain differences of longitude of two heavenly bodies (these bodies being the Sun, Moon, or planets) have been named "*aspects between the two bodies.*"

They are in all twelve, as previously stated.

The first two aspects occur when the difference in longitude is either 0° or 180°. In the former case the two bodies are in *Conjunction;* L L′ in our figure is zero, S and S′ being in the same great circle drawn through K, and on the *same side of K.* In the latter case the two bodies are in *Opposition;* L L′ in our figure is a semicircle; and the straight line joining L and L′ passes through O the Earth's centre, S and S′ being in the same great circle drawn through K, but on *opposite sides* of K.

The remaining ten aspects occur when the difference of longitude is of the following magnitudes:—30°, 36°, 45°, 60°, 72°, 90°, 120°, 135°, 144° and 150°. In our figure L L′ in the case of these several aspects is equal to the 12th, 10th, 8th, 6th, 5th, 4th and 3rd parts of the whole circumference, and the differences between a semi-circumference and the 8th, 10th, and 12th parts respectively.

These twelve aspects are sub-divided into *major* and *minor.*

The *major aspects* are *Conjunction*, *Opposition*, 60° (or *sextile*), 90° (or *square*), and 120° (or *trine*).

The *minor aspects* are 30°, 36°, 45°, 72°, 135°, 144°, and 150°.

P. *On two heavenly bodies being in equal declination.*

The meaning of two heavenly bodies being "*in equal declination*" has been previously explained. We may remark, that it is immaterial whether the declination of either is north or south, as long as the absolute magnitude of each declination is the same.

In the case of the Sun, Moon, and Planets, when any two of them are in equal declination, this relative position is found to be of such importance as to justify us in classing it with the major of the twelve aspects described in O, and in naming it a thirteenth aspect (of the major class).

CHAPTER II.

THE SUN. ⊙

Si vero Solem ad rapidum, lunasque, sequentis
Ordine, respicies; nunquam te crastina fallet
Hora, neque insidiis noctis capiere serenæ.

Virgil, Georgic I, l. 425.

Observe the daily circle of the Sun,
And the short year of each revolving Moon;
By them thou shalt foresee the following day;
Nor shall a starry night thy hopes betray.

Dryden.

THIS immense body is said to be five hundred times larger than all the planets, which revolve around him, taken together. Being the centre of our system, and the source of light, heat, electricity, &c. he must be the first to be considered in our attempt to describe the influences of those heavenly bodies which have been found by observation to possess the chief power in the regulation of the atmospheric changes. Until lately he was stated to be 95,364,400 miles distant from the Earth. But Mr. Hind has in a letter to the *Times* quoted the statement of M. Le Verrier, that the distance is really 91,328,600 miles*.

* Commander Morrison, R.N., author of "The Solar System as it is and not as it is represented" (London, Berger, 12, Newcastle Street, Strand), wrote the following letter to the *Sun* on an interesting discovery he has made, viz. "that as the diameter of the Moon is to the distance of the Moon, so is the diameter of the Sun to the distance of the Sun." This theory "gives the velocity of light as 183,722 miles per second, instead of 192,000 miles, as hitherto supposed."

"SIR,—It has been recently announced, on the part of the Astronomical world, that they have hitherto been in error as to the distance from the Sun to the Earth. The error amounts, they say, to four millions and

Sir John Herschel says, "The absolute uniformity of the "Sun's emission of heat is open to considerable doubt. From "some recent inquiries by Professor Wolf, it would appear "subject to a periodical increase and diminution connected with

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thirty-six thousand miles; and it seems that M. Le Verrier now adopts the idea that the Sun's horizontal parallax is 8·95 sec.; and that, therefore, the true mean distance of the Sun from our Earth is only 91,328,600 miles, instead of what Professor Encke has hitherto taught, viz. 95,364,400 miles. Now, if these gentlemen had only considered that the all-wise Creator has made all the universe by "weight and measure," and that it is, therefore, impossible that our Earth, the Moon, and the Sun, should have been made at haphazard, and without any design in their constitution and proportions, they might have determined the true distance of the Sun long ago. A conviction that some definite relation must exist between the dimensions and distances of these glorious bodies has led me to the discovery of the true distance of the Sun, without any reference to those doubtful observations on parrallax which have so long misled the great astronomers of Europe. I have discovered this relation between the Moon, the Earth, and the Sun, viz., "that the diameter of the Moon is to the mean distance of the Moon's surface from the Earth's surface as is the diameter of the Sun to the mean distance of the Sun's centre to the Earth's centre." Also, that the diameter of the Earth is to the diameter of the Sun in exactly the same ratio or proportion. From this I find that the true distance of the Sun from the Earth is exactly 91,493,000 miles; which distance differs from that now given by M. Le Verrier only by 164,400 miles And whereas that astronomer gives the horizontal parallax at 8.95 sec., I find it, as above, to be 8.94 sec.

I think this discovery is undeniable evidence of the existence of design in the creation of the Sun, Moon, and Earth.

To satisfy persons who may desire to examine the evidence of these facts, I beg to append the data, on which my calculations are founded, as follows:—The diameter of the Moon is 2,159·3 miles. The diameter of the Earth is 7,912·4 miles. The mean distance of the Moon's centre from the centre of the Earth is exactly 237,231 miles=59·9643 mean radii of the Earth. This gives the distance of the surface of the Earth from the surface of the Moon=232,195 miles. And this, divided by the diameter of the Moon, gives the ratio—107,532; which, multiplied by the mean

"the abundance and paucity of spots on its disc, a connection "surmised by the late Sir W. Herschel." . . . . . .

"Independent, however, of any such cause of inequality, the "amount of solar heat momentarily received by the Earth is "subject to a regular annual fluctuation to the extent of one-"fifteenth of its mean amount, due to the eccentricity of the "Earth's orbit—the heat received *in perihelio* (or on the 1st of "January) being to that *in aphelio* (July 2nd) as 16 to 15. As "the Sun is vertical over the southern tropic about the former "epoch, and over the northern about the latter, it would seem "at first sight that the southern hemisphere would receive per "annum a larger supply of heat; but the unequal angular velo-"city of the Earth in its orbit, which varies in the same precise "ratio, effects an exact compensation in this respect by giving a "*shorter* duration to a *hotter* summer in the souther hemisphere, "and a *longer* to a *cooler* one in the northern. . . . . From "experiments made at the Cape of Good Hope, from Dec. 23, "1836, to Jan. 9, 1837, by the writer, it results that the direct "heating effect of a vertical sun at the sea level is such as would "suffice to melt 0·00754 in. per minute in thickness, from a "sheet of ice exposed perpendicularly to its rays."*

Admiral Fitz Roy (*Weather Book*, pp. 212-13), says, "When

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diameter of the Earth, gives the diameter of the Sun=850,842 miles. And this again, multiplied by the same ratio, gives the mean distance of the Sun from the Earth, as above stated. The apparent mean diameter of the Sun, taken at 16 minutes (which is allowing 3·3 sec. for refraction), gives the distance only 88,600 miles less, differing from Le Verrier 76,600 miles.—Yours, &c.

"R. J. MORRISON, Commander, R.N."

* The first discovery of *magnetic* rays in the solar spectrum is due to Dr. Morichini, of Rome, who found that some needles had been converted into magnets in consequence of their being left in a part of his laboratory or observatory, where they were exposed to the action of a prism: this suggested some experiments, upon which he established his doctrine that the *blue* and *violet* rays possessed the power of producing magnetic properties in needles. This general proposition has been contested by

"the Sun, material mover of our atmosphere, has recently "crossed the line, when he has lately been near a solstice, or "when his influence has been for a time in vertical action over

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other natural philosophers, who have failed in obtaining the desired result, when they adopted this mode of proceeding.

Dr. Charles T. Pearce, M.R.C.S.E., while engaged with Sir R. Vyvyan, twenty years ago, in researches on the magnetism of the Moon's rays, obtained the following results :—

"A common sewing-needle placed with care upon the surface of a cup "of water, and floating upon it, developed a polarity without the inter- "vention of any prism, by arranging itself gradually, *with its thinnest "part or point towards the north, and its head, or thickest part, "towards the south.* The experiment was frequently repeated, and the "result was always the same, except in one instance, when the head of "the needle was very thin : the inference being, that the polarity of the "needle was governed by a law, which made that end having the least "bulk a north pole. When the inductive influence of the Sun or Moon "acts upon the matter constituting the surface of this globe, the most "unobserving person is sensible of its effects, in many respects similar "to those produced by the influence of chemical changes, which depend "upon terrestrial causes alone. Heat, light, and a gravitating energy, "may be generated upon the Earth without the assistance of the Sun or "any other heavenly body, and it seems probable, that there is no "difference between the *basis* of the intense light produced by our "chemical experiments, and that of the Sun's rays. Still, the physical "excitement occasioned by the inductive sympathetic energy of the Sun, "even supposing its results were specifically like those produced by "chemical experiment, must interfere with the simple terrestrially-pro- "duced course of events, and give rise to an occasional chemical action "upon the Earth's surface, capable of disturbing the regularity of its "*conductively*-occasioned changes. But the influence of both solar "heat and light differs considerably from that produced upon the Earth "by any chemical experiment of our own, or by any natural terrestrial pro- "cess hitherto observed ; and when we reflect on the complicated method "of excitement to which the sympathetic relations in question between "the Sun and the Earth must be due, we only reason consistently in "supposing—that there is at least as great a superiority in the influence "of the Sun's rays over those of any common source of heat and light "within our atmosphere, as there is between the interpolar magnetic

"any parallel of latitude, how marked, general, and notorious "are the consequences!

"Changes of monsoons, storms, heavy and perhaps continuing "rains, everywhere, more or less (under corresponding conditions "of physical geography), are recurring evidences of the very "general accordance, similarity of action, and most extensive "intercommunication always existing in our atmosphere.

"In such grand disturbances as these, the lunarist should "endeavour to trace the influences of the Moon, and the Astro-"Meteorologist even those of planets. Welcome, indeed, would "each *proved* effect of either be—duly eliminated from masking "effects of other causations; and *described intelligibly*."

We have endeavoured to shew the results of the planets crossing the line, in the chapters devoted to the influence of the planets, we trust we have done so "*intelligibly*."

Four years ago a member of the British Meteorological Society published a work, in which he said, "Evaporation is the origin of all great atmospheric disturbances;" and he asserted that it is the action of the Sun that produces the evaporation, and is, therefore, the origin of all great atmospheric disturbances. This is manifestly wrong. He does not seem to have remembered that the declination of the Sun is always the same on any given day of one year as of another, and that the Sun rises, souths, and sets at precisely the same time in any given place on the same day in every year; and that, therefore, there is no reason why, if the Sun alone cause a certain amount of evapo-

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"current and the galvanic energy, of which it is the offspring. Not "only may it be supposed, that the sympathy between the heavenly "bodies is capable of stimulating particles and corpuscles of *terrestrial* "matter to develope the same chemical relations to each other, as those "which they would exhibit, when subordinate changes of position are pro-"duced by our artificial interference with terrestrial causes and effects—"but that a new order of influence, which is one of *magnetism* in a "more restricted meaning of the word, is hereby developed—which has "been proved most satisfactorily by submitting the magnetic needle to "the influence of refracted solar or lunar rays."

ration on a given day, in any year, in a given place, and that evaporation is the origin of great atmospheric disturbance, the same result should not occur on the same day, in that place, in every year. The Sun continues the same, the ocean remains the same; and as the evaporation should be the same, there is no reason why it should not produce the very same atmospheric disturbance. But every one knows that this is not the case. Yet the writer says, "The Sun is, undoubtedly, the primary cause of all the changes that take place in the weather." And after laying down this axiom he proceeds to shew, that such being the case, it is impossible the weather can ever be foretold, unless by tracing the solar heat through its connection with aqueous matter! He also imagines that predictors of the weather never *write* their predictions; because, if they did, and only "read their predictions" when the weather foretold was to happen, "it would be likely to induce them to abandon the practice of predicting." And he says, that two eminent meteorologists have found themselves "without scientific knowledge of meteorology." And again, "We are, therefore, without a satisfactory theory to connect the facts that have been collected; and with all our industry, are obliged to confess, in the language of the Astronomer Royal, that 'we are absolutely stopped from making further progress by the total absence of even empirical theory.'" And also that "it is acknowledged by eminent men, that we have learned only the extent of our own ignorance of meteorology *as a science!*"

The Sun is the "material mover of our atmosphere" (as Admiral Fitz Roy states), and it is when the planets are in aspect to him that they are most powerful. When "mutual" aspects are formed between the planets the effects are much more marked when one of them aspects the Sun also.

When there are no important aspects, and the Moon is not in any "extreme" position, the weather is generally *seasonable.*

It is well-known that animal development is greatly promoted by the invaluable blessing of the solar rays and heat. Animalcules are not generated in organic solutions undergoing decomposition

if they be kept from the sun-light. If a tadpole be deprived of sun-light it will never become a frog, but will die a tadpole. Spinal deformities, &c. afflict the children of the poorer classes, who, by a cruel necessity, are reared in alleys, courts, and cellars, where the Sun never shines. Dr. Ellis says, "Women and "children, as well as men, in order to be healthy and well deve- "loped, must spend nearly all, or certainly a majority of their "time during the day-light, when the solar-rays can reach them "directly. During very hot weather, for a few hours during "the excessive heat of the day, the shade of a tree, grove, or "even an airy house, *without blinds or curtains*, may be sought; "but never our dark parlours and rooms, for the cold 'damp of "death' is within them. Houses are only fit for occupancy "during the night by being purified and dried by the solar rays "during the day." It has been stated, that the reason why women and children who live in the huts and log cabins of America, which contain but one or two small rooms, are strong and healthy, is that these dwellings are well-ventilated, and the sun-light enters freely; and this supposition derives additional weight and force from the fact, that after the settler has built a house, and has furnished it with blinds and curtains, the women and children soon become pale-faced, anemiated, nervous, and sickly; while the fathers and brothers who live in the open air all day remain perfectly healthy. And it would appear, from the fact that in the deep narrow valleys of the Alps, which the direct solar rays seldom reach, cretinism, more or less complete, is very common, and frequently assumes the character of an epidemic, that the *mens sana in corpore sano* is a rarity when people are deprived of sun-light.

During the prevalence of the Asiatic Cholera in our great cities, it was observed that the mortality was much greater in courts and narrow streets. It is said that in the hospitals of St. Petersburg the number of cures effected among patients who were placed in well-lighted wards was four times greater than among those who occupied dark rooms.

Ptolemy (Chap. xii, Book II of the *Tetrabiblos*) gave the

following observations of "*the particular natures of the signs by which the different constitutions of the atmosphere are produced,*" when the Sun was passing through them, and at the periods of new and full Moon occurring during the Sun's progress in each sign.

"The sign of ARIES has a general tendency, arising from the presence of the Equinox, to promote thunder and hail.

"The sign of TAURUS, in its general character, partakes of both temperaments [the temperaments here alluded to are, probably, heat and cold], but is nevertheless chiefly warm. Its front parts, and especially those near the Pleiades, produce earthquakes, clouds, and winds: the middle parts are moistening and cooling; those behind, and near the Hyades, are fiery, and cause meteors and lightnings. The northern parts are temperate; the southern turbulent and variable.

"GEMINI, in its general tendency, is temperate. The northern parts promote earthquakes and wind; and the southern are dry and heating.

"CANCER is, on the whole, serene and warm, but its anterior parts near the Præsepe are oppressively hot and suffocating; the middle parts are temperate, and the latter parts excite wind. And both its northern and southern parts are equally fiery and scorching.

"LEO has a general tendency operative of stifling heat. The anterior parts are oppressively and pestilentially hot; yet the middle parts are temperate; and those behind are injurious by means of moisture. The northern parts produce variation and heat, and the southern moisture.

"VIRGO, in its general tendency, excites moisture and thunder. The front parts, however, are chiefly warm and noxious, the middle temperate; and the latter parts watery. The northern parts promote wind; the southern are temperate.

"LIBRA has a general tendency to produce change and variation. Its front and middle parts are temperate; its hinder parts watery. The northern parts cause variable winds, and the southern are moistening and pestilential.

"SCORPIO, in its general character, is fiery and productive of thunder. The front parts cause snow; the middle are temperate, the latter parts excite earthquakes. Its northern parts are heating; its southern moistening.

"SAGITTARIUS, generally, is effective of wind. The front parts are moistening; the middle temperate; and the hinder parts fiery. The northern parts promote wind, and the southern variation and moisture.

"CAPRICORN's general tendency is to operate moisture. But its anterior parts are pernicious by means of heat, its middle parts are temperate, and its latter parts promote rain. Both its northern and southern parts are injurious by means of moisture.

"AQUARIUS, in its general character, is cold and watery. The front parts are moistening; the middle temperate; and the latter parts productive of wind. The northern parts are heating; the southern cause snow.

"PISCES, in its general character, is cold and effective of wind. The front parts are temperate; the middle moistening; the hinder parts highly heating. The northern parts excite wind, and the southern are watery."

CHAPTER III.

THE MOON. ☽

Atque, hæc ut certis possimus discere signis
Æstusque, pluviasque, et agentis frigora ventos;
Ipse Pater statuit, quid menstrua Luna moneret;
Quo signo caderent austri.

Virgil, Georgic I, l. 351.

And that by certain signs we may presage
Of heats, and rains, and winds' tempestuous rage,
The sov'reign of the heav'ns has set on high
The Moon to mark the changes of the sky.

Dryden.

MANY and totally different influences on the weather have been ascribed to our satellite in all ages. As Admiral Fitz Roy said in a letter to the *Daily Telegraph*, "every weather-wizard appeals to the Moon;" we therefore think it will be well to commence this chapter with the remarks of Claudius Ptolemy:—

"The Moon's course is to be carefully observed, at the third "day before or after her conjunction with the Sun" (new Moon), "her opposition" (full Moon), "and her intermediate quarters; "for if she then shine thin and clear, with no other phenomena "about her, she indicates serenity; but if she appears thin and "red, and have her whole unilluminated part visible, and in a "state of vibration, she portends winds from the quarter of her "latitude and declination*; and if she appear dark, or pale and "thick, she threatens storms and showers. All halos formed "around the Moon should also be observed; for if there appear

* Virgil says,

"At, si virgineum suffuderit ore ruborem
"Ventus erit: vento semper rubet aurea Phœbe."

Georgic I, l. 430.

"one only, bright and clear, and decaying by degrees, it pro-
"mises serene weather; but if two or three appear, tempests
"are indicated: and, if they seem reddish and broken, they
"threaten tempests, with violent and boisterous winds; if dark
"and thick, they foreshew storms and snow; if pale, or black
"and broken, tempests with winds and snow, both: and when-
"ever a great number may appear, storms of greater fury are
"portended."

Sir John Herschel in his article on *The Weather and Weather Prophets* in *Good Words* for Jan. 1864, says: "The Moon is
"often appealed to as a great indicator of the weather, and
"especially its changes as taken in conjunction with some exist-
"ing state of wind or sky. As an attracting body causing an
"'aërial tide,' it has, of course, *an* effect, but one utterly insig-
"nificant as a meteorological cause; and the only effect dis-
"tinctly connected with its position with regard to the Sun
"which can be reckoned upon with any degree of certainty, is
"its tendency to clear the sky of cloud, and to produce not only
"a serene, but a *calm* night, when so near the full as to appear
"round to the eye — a tendency of which we have assured our-
"selves by long-continued and registered observation. This,
"however, is more than a 'simple connotation.' The effect in
"question, so far as the clearance of the sky is concerned, is
"traceable to a distinct physical cause, the warmth radiated from
"its highly heated surface; though why the effect should not
"continue for several nights after the full, remains problematic.

"Lunar prognostics about the weather may be classed under
"three several heads,—viz., 1st, Simple connotations of the ap-
"pearance of halos, coronas, lunar rainbows, and a 'watery'
"moon, as prognostics of wet. No doubt they do indicate the
"presence of vapour, passing into cloud, in the higher regions of
"the air (in that of the rainbow, actual rain not far away), and so
"may be put on a par with the indications which may sometimes
"be gathered from the behaviour of birds, especially such as fly
"high, and make long excursions, and which may convey to us
"some notion of *their* cogitations as to the coming weather,

"which are perhaps more likely to be right than our own, as "founded on a wider range of perception. 2nd, Purely arbitrary "*laws* or *rules* founded on the hour of the day or night at which "the changes of the Moon take place. There is (or was a few "years ago, for we believe the race is dying out) hardly a small "farmer, or farm-labourer, who had not some faith in certain "'weather tables' in the 'Farmer's Almanac,' ascribed (we need "hardly say falsely) to the late Sir W. Herschel, and which went "on this principle. Others, again, pressed into the service the "great and recondite names of apogee and perigee, and professed "to determine the character of the lunation from her proximity "at new or full to these mysterious points of her orbit. Both "the one and the other rule utterly break down when brought to "the tests of long-continued and registered experience. Others, "again, drew their prognostic from the character of the weather "during the first quarter. Such was the rule said to have been im- "plicitly adhered to by the late Marshal Bugeaud in the planning "of any military expedition whose success was likely to be any "way dependent upon the weather. 3rdly, A more ambitious form "of lunar prediction was that of the late eminent meteorologist "(for such, this one crochet excepted, he certainly was), Luke "Howard, who took great account of the Moon's declination as "influencing the *averages* of rainfall, and of the height of the baro- "meter. Still more so was his weather-cycle of nineteen years, "the period of the circulation of the nodes of the Moon's orbit; in "the course of which the *absolute maximum of north declination* "occurs when the ascending node is in the spring equinox, and "the Moon 90° in advance of the node in her orbit; and that of "*south* in the reversed circumstances—the intermediate situations "of the node corresponding to the *absolute minima* of each. "These situations according to the declination theory, ought to "bring round a periodical increase and diminution in the average "rainfalls and barometric heights. Like the others, however, "when compared on any extended scale with recorded facts, this "results in no establishment of any positive conclusion."

Admiral Fitz Roy says (*Weather Book*, p. 256), "In fine

"weather—*at night*—whether the Moon is visible or not, whether "full, or near any other period, there is a *general* tendency (as "many a *night-watcher* knows) towards a disapperance of clouds "soon *after* evening. Sometimes *slight* rain falls, and not a cloud "is seen afterward for some hours. Oftener dew is deposited, but "in either case clouds soon vanish in *still weather*."

"*Saxby's Weather-System**."

Mr. Saxby says, at p. 100 of his book:—"The following is "what Europe now hears of as 'Saxby's Weather-System':—

"I found that the Moon never crosses the Earth's Equator, "or reaches her position of stitial colure, without a marked "disturbance of the atmosphere occurring at the same period. "Therefore I began by combining these lunar changes and "actual weather disturbances into the relationship of 'cause and "effect.' . . . . . "*When the lunar equinox or stitial colure, "occurs at the same period as the new Moon in perigee, the greatest*

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* The discovery of this system by Mr. Saxby was disputed (in the *Standard)* by Capt. Morrison, R.N., as follows:—

Mr. Saxby's Weather Warnings.

TO THE EDITOR.

SIR,—I hope you will do me the justice to allow me to state that the above gentleman is not, as he says, "the sole discoverer of the lunar theory." As long ago as 1837 I published *The Meteorological Almanac*, in which the theory of changes in the electrical condition of the atmosphere was asserted at the period of the Moon's passing the equator and the tropics. The only portion of Mr. Saxby's theory that is novel is that which he terms "cyclone," and that, so far as I can perceive from his works, appears to me to be unfounded.

As to obloquy, I certainly have had my share, as well as ridicule, because I believe that other bodies, as well as the Sun and Moon, affect our atmosphere when on the equator, as was the case on the 1st instant, when a furious storm arose from Saturn being on the equator.

Yours, &c.

Jan. 9, 1863. R. J. MORRISON, Lieut., R.N.

"*atmospheric disturbances to which our Earth is liable may then* "*be expected with certainty of fulfilment.*

"Now either the Moon crosses our Equator, or is at her stitial "colure (or greatest distance from our Equator) about once in a "week (it is possible that one of each may happen in the same "week), therefore there is an atmospheric disturbance from this "cause, say once a week, and it is invariably traceable."

In marking the periods of atmospherical disturbance, Mr. Saxby says—"If the day marked prove calm and still, distrust the day after, and especially the *second day after.*"

This lunar weather theory is perhaps the best yet advanced, but we have observed that the Moon acts in a *secondary* manner only, i. e. *when her positions or phases agree with those of other heavenly bodies;* and Sir J. Herschel says the Moon's effect is "utterly insignificant as a meteorological cause."

In Chapter I of the *Weather Book*, Admiral Fitz Roy says, "It "is remarkable that 'Astro-Meteorologists' and 'Lunarists' have "not noticed that their supposed causes of weather must, if "existent, affect entire zones of our atmosphere, in diurnal "rotation, instead of one locality *alone*;* and that such results "are not proved by the facts observed."

There can be no doubt that entire zones *are* affected by the "supposed causes," but may not different localities be affected in a somewhat different manner? An aspect of Saturn or Venus to the Sun, which would cause in London heavy rain, would produce at Malabar a small deluge, because the rain-fall on that coast *often exceeds* 120 *inches per annum.*

Astro-Meteorologists have long asked for observations from all parts of the globe, so that reliable information may be obtained as to the effects in the different zones of the various positions of the heavenly bodies. And we believe Mr. Saxby has made similar requests.

Admiral Fitz Roy continues, "coincidences being much noticed,

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* This we have done in the chapter on Storms: see the records of remarkable weather in all parts of the world in the year 1862.

"generally speaking, but few persons treat them as merely casual, "and they often obtain undue importance."

Astro-Meteorologists have always been especially careful to trust only those coincidences which are of sufficiently frequent occurrence to be beyond the region of chance.

In the *Weather Book*, pp. 246-7, we read, "*Recurring periods*," of atmospheric waves, "of about fourteen days (semi-lunar), of "seven days, and of less intervals, have been traced, (however "masked and irregular) as more or less synchronous with the "Moon's phases, *occasionally*, and then, for a few times, rather "correspondent—therefore indicating some kind of connexion:— "but a *vera causa* has seemed to be wanting for an explanation."

Again, "during the Moon's passage, in her orbit, from quad- "rature to syzygy, her action on air-currents should increase, "and conversely. When she has great north declination, it "ought to be greater *here* than when she is far south, and when "in perigee greater than in apogee. Tabular records show that "such are the facts*."

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* Dr. Pearce, whose experiments with the needles were quoted at pp. 28-9, says, "having attained this position, it became important to apply the principle to the Moon. For some time, the experiment failed, because although the prism afforded a beautifully clear spectrum of the Moon at full, (when placed between that body and the eye) the refracted light was so inefficient that it became almost imperceptible when it was reflected from any object unless it had the qualities of a mirror; and as the needles had been acted upon by the solar spectrum when they were exposed to the magnetic rays on a table, it seemed almost impracticable to adopt the same method, and to discover a suitable mode of operating with the lunar spectrum, unless the prismatic action was made to bear upon the needle when it *was floating upon water*.

"When the experiment was first made, the Moon was nearly full, and the Sun had been for some time below the horizon; but on a subsequent occasion it was repeated an hour before sunset, four days before full Moon, with great care and accuracy; and as the interposition of glass had no effect upon the magnetising action of the solar spectrum, the author was enabled to make his observations in a well-closed room, and

We extract the following paragraph from the *Intellectual Observer*, Nov. 1863:—

"THUNDERSTORMS AND THE MOON. — M. Bernardin calls the attention of the Belgian Academy to the fact that many thunderstorms have occurred about the period of the new or full Moon, and he invites inquiry for the purpose of ascertaining whether there is any connection between the movements of our satellite and the electrical condition of the atmosphere."

A thunderstorm occurred on the 20th of May, 1864, near the

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to prevent any currents of air from acting upon the surface of the water, or from moving the needle. It is evident that if the hypothesis about the existence of a powerful magnetic influence in the Moon-beam was well-founded,—the presence of daylight ought not to interfere with the lunar magnetism. The needle was then placed as in the experiment with the solar rays, and the prism was held in such a position that the unbroken image of the Moon was *reflected* to the eye from the *inner* surface of the side of the prism, and so brought to bear upon the needle that this *unrefracted* image was immediately over the needle; the floating needle itself was therefore under the intermediate side of the prism which was parallel to the surface of the water, and almost in contact with it. In order to prove that the prism itself possessed no disturbing influence it had been previously brought close to the needle in various ways, without occasioning the least change in its position. The following observations were then made:—

1. The needle, with its point towards the north magnetic pole, almost immediately exhibited the effects of the lunar influence. At first, *its point deflected from the magnetic pole to the true north pole of the Earth.* Then the whole needle began to move *laterally*, but slowly, *towards the blue rays of the spectrum;* and after this, its point gradually turned towards the east. When it had placed itself at right-angles to the true meridian of the Earth, or *was parallel to the Earth's equator*, it suddenly acquired a new and contrary impulse, and a comparatively rapid, darting motion, from east to west, in *the direction of its length;* its head took the lead, but soon turned towards the north. This produced a new compound curvilinear movement of the whole needle, which at last brought its head round to the true north pole of the Earth, where it remained stationary for a time, if the prism was held in the same position.

period of full Moon—which took place at $1^h\ 24^m$ P.M. of the 21st inst.—but why? because the Moon passed Jupiter at $9^h\ 28^m$ P.M. of the 20th, and the Sun was in *equal declination* with Mercury on the same day, Mars having been 90° from Uranus on the 19th.

Therefore, *we* "invite inquiry for the purpose of ascertaining whether there is any connection between the movements of our satellite," and *also of the planets Jupiter and Mars*, "and the electrical condition of the atmosphere."

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2. When the prism was continuously held in the same position, the needle soon began to move laterally as before, and the head turned towards the east; but, although it went through the same varied and peculiar orbitual rotation, the motion was much slower than before; it was stationary for a moment when parallel to the Earth's equator, which was not the case when its point was in that position, and the darting motion which followed was less rapid; but it seemed to undergo the same extent of bodily movement, as to distance, before its poles regained their subsequent parallelism to the poles of the Earth. When, however, it arrived at that position, and its *point* was the north pole of the needle, *there was no pause, as was the case when its head was so placed;* for the needle began immediately to move bodily towards the blue rays of the spectrum.

3. When, however, the prism was removed (as soon as the *head* of the needle pointed to the north pole of the Earth and became stationary) and was almost immediately afterwards replaced, the rotation was reversed, and the head of the needle moved *towards the west.*

Finally, when the prism was removed permanently, the needle soon arranged itself in the magnetic meridian, with that end pointing towards the north, which was there when the prismatic influence ceased; but the change of the poles was not permanent, as had been found to be the case when the needle was acted upon by the direct influence of the Sun; for *its point* gradually came round to the north, if *its head* had been left in that position, when the prism was removed . . . . Upon examining the Moon's refracted rays, by bringing the prism between her image and the eye, with nearly the same inclination as when it was thrown upon the needle, her clearly-defined and brilliantly-colored spectrum exhibited the *blue rays nearest the horizon.*"

Virgil derived all his 'weather-wisdom' from the writings of the Greek poet Aratus.

The following lines are extracted from a beautiful poem, translated from the Diosemeia of Aratus, by Dr. Lamb:—

"Those, who the weather's various signs would trace,
Must watch fair CYNTHIA's ever-changing face:
Mark her, when rising from the eastern waves—
Mark her, when in the west her limbs she laves.
If three days old her face be bright and clear,
No rain or stormy gale the sailors fear;
But if she rise with bright and blushing cheek,
The blustering winds the bending mast will shake.
If dull her face and blunt her horns appear
On the fourth day, a breeze or rain is near.
If on the third she move with horns direct,
Not pointing downward or to heaven erect,
The western wind expect; and drenching rain,
If on the fourth her horns direct remain.
If to the earth her upper horn she bend,
Cold Boreas from the north his blast will send.
If upward she extend it to the sky,
Lond Notus with the blustering gale is nigh.
When the fourth day around her orb is spread
A circling ring of deep and murky red,
Soon from his cave the god of storms will rise,
Dashing with foamy wave the lowering skies.

A HALO oft fair CYNTHIA's face surrounds
With single, double, or with triple bounds.
If with one ring, and broken it appear,
Sailors, beware—the driving gale is near.
Unbroken if it vanisheth away—
Serene the air, and smooth the tranquil sea.
The double halo boisterous weather brings,
And furious tempests follow triple rings.
These signs from CYNTHIA's varying orb arise—
Forewarn the prudent, and direct the wise.

CHAPTER IV.

THE PLANET JUPITER. 4.

"With mighty state, the rival of the Sun."

JUPITER is the largest planet of our Solar system. Its diameter is about 89,108 miles—11½ times the diameter of the Earth, and nearly $\frac{1}{10}$th part that of the Sun. Its mass exceeds that of the Earth 1428 times. Its magnitude is so vast that were Mercury, Venus, Mars, the Earth, the Moon, Saturn, Uranus, Pallas, Vesta, Juno, and Ceres combined, they would scarcely be equal in amount to the mass of Jupiter.

The chemical action of the rays reflected by Jupiter is very great. "Out of an equal quantity of light incident upon the two bodies, Jupiter reflects fourteen times more of the chemical rays than the Moon does."

It has long been observed — through many centuries—that when Jupiter is in certain relative positions in regard to the Earth, the Sun, and Mars, the mean temperature rises considerably above the average; the barometer is generally above 30 inches; and *dry* weather prevails. Frequently strong (northerly) winds attend the 'aspects' of Jupiter, and there is great generation of ozone. Owing to the great amount of electricity generated in the atmosphere thunder-storms frequently occur under Jupiter's influence — as on the 30-31 of October, 1863, the period of Solar conjunction of Jupiter — hence, probably, the title of 'the thunderer' (Jupiter *tonans*) given to the 'god' Jupiter by the Greeks and Latins, who observed that when the 'gods' Mars, Kronos (Saturn), and Apollo (the Sun) approached Jupiter in the heavens, thunderstorms took place.

In regard to the generation of ozone under Jupiter's influence

we would instance the *stationary* position of this planet on March 13th, 1864, and the Sun 120° from Jupiter on the 17th. In Mr. Allnatt's letter to the *Times* on "the weather of March 1864," the following passages occurred:—"13th, rapid gene-"ration of ozone. . . . . From the 17th to the 24th there was "a remarkable generation of ozone, particularly on the 17th, "22nd, and 23rd, when the slips indicated respectively 10 deg. "Its action was invariably abundant during rough and gusty "N.E. winds. . . . . On the 16th the ozonoscope indicated "10 deg."

Ptolemy taught that "Jupiter is fruitful and airy, and expressly connected with winds proceeding from the *north*." In the book of *Job* we are told that "fair weather cometh from the *north*;" and in *Proverbs*, that "the north wind driveth away rain." In our climate fair and dry weather attends northerly winds (under Jupiter's aspects); and these winds raise the barometer.

Jupiter's influence is also potent in causing meteors and earthquakes—to which we shall refer again.

Jupiter's influence generally commences from three to four days *before*, and continues for about the same period *after* the aspect is completed.

In 1864 we have had striking instances of Jupiter's action and influence.

1st Period.—Sun 60° from Jupiter January 13th.—The new year was ushered in by a severe frost (under Sun 90° from Saturn on the 8th) which lasted till the 9th: when Jupiter's influence came into operation, it gradually disappeared — the *mean* temperature at the Kew Observatory rose 9° (from 25°·6 to 34°·6). Mr. Burder, of Clifton, said in a letter to the *Times:* "the mean temperature of the week," ending Jan. 16th, "was no less than 13°·8 *above* that of the previous week."

2nd Period.—Sun 90° from Jupiter, Feb. 15th.—A frost set in on the 6th, which lasted till the 11th. On the 12th the *mean* temperature rose 13°·5 (at the Kew Observatory). (Mars forming the angle of 45° with Jupiter on the 12th hastened and enhanced

Jupiter's influence.) Mr. Allnatt said, in his letter to the *Times* on "the weather of February";—"from the 5th to the 10th we have the apparent anomaly of the barometer gradually sinking from 29·95 inches to 29 inches, during which a northerly wind prevailed, and ice in exposed situations attained the thickness of two inches. On the evening of the 10th the wind touched the south, and the barometer suddenly turned and rose 0·10 in., and on the following day it had risen nearly one inch, when rapid thaw set in."

3rd PERIOD.—March 13th, Jupiter *stationary*. 17th, Sun 120° from Jupiter.—On the 9th and 10th snow and frost. On the 12th the weather moderated, and the barometer rose (at Kew) ·591 in. The only days on which the barometer (corrected and reduced to temp. 32°) reached 30 inches were the 12-14, and the 16-17 instants. The Registrar-General said, that in the week ending March 19th, "the mean temperature of the air was 43°, which is 1°·5 above the average of the same week in forty-three years. The mean daily temperature was in excess of the average on four days of the week, and on Monday the excess was 8°·2. The highest day temperature was 57°·2 on Monday. The rain-fall was only 0·06 in. . . . . The mortality in London was 156 lower than in the week previous." The author wrote the following prediction, which appeared in the *Northampton Mercury*, Feb. 6th, 1864:—"Jupiter *stationary* in the middle of March should bring vegetation very forward—it will certainly cause a high barometer and dry weather from the 13th to the 21st of March, as the stationary position of this planet did in February 1863, when (the 13th inst.) 'the barometer had not been so high since the 11th November, 1859,' at Althorp."

4th PERIOD.—Sun 150° from Jupiter, April 15th, 1864.—The Registrar General's report of the week ending April 16th, was:—"The mean temperature of the air in the week was 48°·9, which is 3°·6 above the average of the same week in forty-three years. On three days the mean daily temperature was from 6° to 8° above the average. . . . . The highest day temperature was 68°·5 on Friday. . . . . The rain in the week was only

0·06 in." On the 11th Venus 120° from Jupiter; and on the 12th, Mars 90° from Jupiter, contributed to raise the mean temperature 3°·6 above the average.

5th PERIOD.—Sun in *equal declination* with Jupiter May 9th, and Sun 180° (*opposition*) from Jupiter, May 13th. Mars 120° Jupiter, May 17th, 1864.—This period was an extraordinary one, being remarkable for intense *heat*. On the 19th, Mr. Lowe (Highfield House Observatory, Notts.) wrote to the *Times*, stating, that "Yesterday the thermometer in the shade rose to 87°·7, a temperature that has not been reached in May since 1794, when registering instruments were set up at the Royal Society." Mr. Plant, of Birmingham, wrote on the same day, saying, "The heat of the past five days is most remarkable for the season. The last hot weather in this month of importance was in 1858. The mean maximum readings did not, however, reach those of the present May. It must also be borne in mind, that the hot weather six years ago did not commence till the 29th May. The mean of 24 hours during each of the past five days has ranged from 13° to 16° above the average*." Mr. Moss (Hadley-park, Salop) wrote to the *Times*,

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* The following letters, &c. appeared in the *Times* of May 21st, 1864:—

To the Editor of the Times.

Sir,—Will you permit me to assure your correspondent, Mr. John Lewes, of Carmarthen, whose letter appeared in *The Times* of yesterday, that the great and preternatural heat of which he writes is universal?

From the 14th to this date the thermometer has gradually risen until it has attained, when exposed to full Sun, the unprecedented height of 124 deg., the highest register, probably, at so early a date ever recorded in England.

The respective readings since Monday are—16th, 106 deg.; 17th, 113 deg.; 18th, 122 deg.; and to-day, at 4 p.m., 124 deg.

In shade the thermometer and barometer (Negretti's) registered—thermometer, 72 deg.; wet bulb, 67, difference 5 deg.; barometer, 30·25 in.

I would advise astronomers to be diligent just now in probing celestial

May 18th, saying, "The heat was so great this morning, that at 11 A.M. I put the thermometer in the sunshine, and at 11·30 it was at 110, the highest point that I ever saw it at in England." Mr. Henry Doxat (of Clapham) wrote to the *Times*, May 18th, saying, "May 1833 presents a remarkable coincidence with the weather now being so strongly felt. May 15, 16, and 17, 1833,

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space with their powerful instruments, for there would appear physical indications of the approach of the long-predicted comet.

I am, Sir, your obedient servant,

May 18. R. H. ALLNATT.

To the Editor of the Times.

Sir,—The *maximum* yesterday (May 19)—namely, 84·5 deg., exceeds any *maximum* in May, as far back as any records of *maxima* extend (12 years). It also exceeds the extreme temperature throughout the whole summer of any year since 1859, when the *maximum* in July was 86·6 deg. The present heat is so steady that I append the following readings of the dry and wet-bulb thermometers at times not far from the time when the *maximum* occurred :—

	H. M.	Dry Bulb.	Wet Bulb.
Thursday, May 19,	12 (noon)...	81°·0 ...	66°·6
„ „	0 30 p.m.	81 ·0 ...	64 ·2
„ „	1 0 p.m.	81 ·8 ...	65 ·0
„ „	1 30 p.m.	81 ·2 ...	64 ·8
„ „	2 0 p.m.	82 ·0 ...	65 ·3
„ „	2 20 p.m.	83 ·0 ..	66 ·0
„ „	2 30 p.m.	83 ·0 ...	66 ·6
„ „	2 45 p.m.	81 ·4 ...	65 ·1

The *maximum* yesterday occurred at a time between 2.20 p.m. and 2.30 p.m. The instruments were all closely watched, and thus the trustworthiness of the self-registering instrument is confirmed.

It is not often that so high a temperature is maintained so steadily. The *maximum* on Wednesday, May 18, was 81·3. Last evening there were ominous-looking *cumuli* to the north of Clifton, looking very much like the outskirts of a distant thunderstorm.

I remain, Sir, your most obedient servant,

WILLIAM C. BURDER.

Clifton, May 20, 11 a.m.

thermometer 77°, 80°, 80°. This was also during a great drought as now in 1864." [*Mars* 90° *from Jupiter*, May 17, 1833.] "April 1840 was exceedingly hot and dry from the middle till the first week in May: thermometer 81 on April 28, 1840, and often 76 and 74 till May 5." [May 4, the *Sun in conjunction with Mars and in opposition to Jupiter.*] "May 1848 was excessively dry, but the thermometer only reached 74°. Rain fell on the 31st." [*Sun* 60° *from Jupiter*, May 6th. *Mars in conjunction with Jupiter*, May 17th. *Venus* 60° *from Jupiter*, May 26th, *and* 60° *from Mars*, May 31st, 1848.]

To the Editor of the Times.

Sir,—The heat of yesterday was greater than on the 18th, being 89·3 deg. in the shade, or 3·1 deg. hotter than any day in May since 1794.

From 2 p.m. thunderstorms in all directions, but none passed over this observatory.

I am, Sir, your obedient servant,

E. J. LOWE.

Observatory, Highfield-house, May 20.

THE TEMPERATURE.—The following comparison of the registerings during the last few days, and the corresponding days of last year, are from the observations taken at Leeds Philosophical Hall:—

	1864.			1863.		
	Max. in air. Deg.	Min. in air. Deg.	Max. in sun's rays. Deg.	Max. in air. Deg.	Min. in air. Deg.	Max. in sun's rays. Deg.
May 13	70	41	95	58	45	62
„ 14	79	40	99	63	69	66
„ 15	78	50	99	65	45	73
„ 16	83	51	98	63	47	64
„ 17	81	50	94	58	42	64
„ 18	85	54	101	58	37	68
„ 19	81	54	89	59	37	63
„ 20	83	49	95	55	41	62

Yesterday afternoon, about half-past 3 o'clock, the temperature fell several degrees, and rain, accompanied with thunder, descended smartly. The excessive heat of the previous few days made rain very welcome.

A heavy thunderstorm occurred amongst the hills on the 9th of May, 1864, causing a flood in Northumberland. "A heavy storm of lightning, thunder, and rain passed over portions of Yorkshire on Monday afternoon last (the 16th inst.) which caused the river Swale to rise to such a degree that large masses of timber and *débris*, pigs, sheep, and bullocks were washed away by the flood."—(*Times*, May 20th, 1864.)

A despatch, signed W. Swinton, from the head quarters of General Grant's Army, describing the dreadful carnage of the 12th May, 1864, contained the following paragraphs:—"7·30, A.M., a furious rain-storm is falling, and the thunder of the heavens mingles with the roar of artillery and the rattling volleys of small arms in a way impossible to discriminate which is which." . . . . . "12 (noon). The rain has ceased, and the Sun has just burst forth."—(*New York Times*, May 14, 1864.)

The author said in a letter which appeared in the *Northampton Mercury* of April 9th, 1864:—"I anticipate high temperature and generally fine, dry weather from the 9th to the 14th of May*, some thunderstorms on the 13th and 17th. . . . . Let farmers watch the effects of Jupiter's aspects from the 9th to the 14th of May, and from the 7th to the 17th of July. I do not say that every day will be equally fine and warm, but that the general character of the weather at those periods will be very favorable for farming operations." And in a subsequent

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* THE WEATHER AND THE CROPS.—The weather in the Eastern counties this week has been highly favourable for the development of the crops. Monday, Tuesday, and yesterday were distinguished by cloudless skies, and a temperature equal to that usually prevalent in July and August; and the general appearance of the country was luxuriantly beautiful. A Newmarket letter sum up the situation in terms which have a more extended application:—"The splendid weather of the last *fortnight* has considerably benefitted the crops of every description. The wheat in all parts is looking strong and healthy, and barley and oats are growing fast. Seeds and meadow crops have made wonderful progress, and there is now an abundance of cattle feed."—*Times*, May 19, 1864.

letter to the same journal, the author predicted hail showers for the 19th and 20th of May.

"A hail-storm on the farm of Mr. L. W. Stilgoe, of Adderbury Grounds, on the 19th inst., did considerable damage to his crop of beans, wheat, barley, oats, swedes, and mangold wurtzel."—*Northampton Mercury*, May 28th, 1864.

A thunder storm burst over the Metropolis shortly after the Moon joined Jupiter (9^h 28^m P.M.) on the 20th inst.*; and the mean temperature was then reduced to the average under the influence of the Solar conjunction of Mercury on the 23rd, and Mars in *equal declination* with Saturn on the 27th inst.†

We think that the "*vérifications des pouvoirs*" of Jupiter contained in the instances quoted, will satisfy the most sceptical.

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* This storm "passed over the three kingdoms with destructive violence . . . . considerable damage was sustained at Newcastle; the streets were flooded, and several houses struck . . . . . Between South Shields and Newcastle the telegraph wires were so much affected that no messages could be sent, while it is believed that the Shields time gun was fired by the lightning; several fuses also took fire while the gun was being loaded."—*Daily Telegraph*, May 23, 1864.

"In the North Riding . . . . . hailstones as large as nuts fell for some time, and at Sproxton, near Helmsley, and at Allerston, near Pickering, the destruction of glass is reported as very great. The hail and rain have done great damage to the crops."—*Times*, May 23rd, 1864.

† GREAT COLD.

To the Editor of the Times.

Sir,—The great heat left us on the 20th, and has given place to cold of extraordinary severity for the last week in May.

This morning the readings of instruments were as follows:—

Register Thermometers.—Four feet above ground, 31·5 deg.; on grass, 24 deg.; highest in shade in 24 hours, 57 deg.

We have had low readings of temperature all the week. It is many years since we had such cold weather at so advanced a period of the season.

I am, Sir, your obedient servant,

THOMAS L. PLANT, M.B.M.S.

Birmingham, May 27, 1864.

If the weather at the time the angle of 90° was formed by the Sun and *Jupiter* on the 11th of July, 1863, be compared with that at the period of the same angle being formed by the Sun and *Saturn* on the 20th of June, 1863, what a contrast is found! In the former case the barometer was above 30 inches from the 7th to the 15th July (inclusive), *no rain fell;* and the mean temperature was considerably *above* the average*. In the latter case the barometer was as low as 29·550 in. on the 19th of June, *when* 1·246 *inches of rain was registered;* the mean temperature being 5° *below* the average.

In 1863 the mean temperature was *above* the average under Jupiter's aspects on 13, 14, 15, and 16 of January; the 10, 11, and 12 of Feb.; the 9, 10, 11, 12, and 13 of April; the 7, 8, 9, 10, 11, 14 and 15 (8°) of July; and on the 13, 14, and 15 days of August.

Jupiter on Equator, September 6th, 1862.

Results of Meteorological Observations at the Kew Observatory.

1862	REDUCED TO MEAN OF DAY.		WIND.	MOTION.	RAIN.
	Barometer corrected to Temp. 32°.	Temp. of air.	At 9·30 A.M., 2 P.M., and 5 P.M. respectively.	In miles per diem.	Inches.
Sept.	Inches.				
1	29·964	55°·0	N, N N E, N E by N	199	·000
2	29·709	59 ·1	S W by W, S W, S W	163	·050
3	29·629	54 ·3	S S W, S W, W	358	·238
4	29·785	55 ·2	S W, W N W, W N W	80	·016
5	29·831	54 ·8	N N E, N E by E —	94	·000
6	29·948	56 ·6	W by N, W, S S W	84	·008
7	. . .	. . .	. . . . .	121	·000
8	30·082	61 ·2	S S W, W S W, S W	116	·006
9	30·026	60 ·7	W by N, S W, S W by S	134	·003
Means	29·872	57 ·1	Totals . .	1349	·321

* Mr. Burder (of Clifton) writing to the *Times* on "the weather of 1863," said, "the highest temperature of the air was 83°·1 on July 11th"—the *very day* on which the ☉ □ ♃ was formed. At Mr. Lowe's Observatory "the weather was hot from the 5th to the 15th, the temperature reaching 87° on the 10th, 87°·2 on the 11th, and 86°·3 on the 12th."

There was "a tremendous hailstorm in Wilts" on the 2nd, and a gale on the west coast on the 3rd inst.

The last Solar *conjunction* with Jupiter took place on Oct. 31st, 1863 ($4^h\,42^m$ P.M.). On the 28th inst. the Sun and Jupiter were in *equal declination*. On the 30th the Moon arrived at her extreme N. declination, and joined Uranus ($3^h\,26^m$ P.M.). These positions stirred up a storm of wind and rain, thunder and lightning, which commenced on the 30th inst. Great damage resulted in the metropolis. At New Cross an engine shed was unroofed (about $3^h\,30^m$ P.M.). At Stroud the storm was very violent. Mr. Burder (of Clifton), wrote to the *Times* as follows:—"From about 6 P.M. yesterday" (Oct. 30th), "till 6 A.M. to-day we have had a succession of squalls, with lightning, thunder, hail, rain, and wind—such as we seldom witness in our comparatively quiet climate. . . . . The whole of yesterday was stormy, but I did not observe any lightning till 6 P.M. . . . . The discharge of electricity was so great that I should imagine the result would be something terrific if any object were struck by it. . . . . The lightning continued at intervals during the night, and some of the flashes were within a mile of this place."

In concluding this chapter we would remark that the coincidences of high temperature, thunderstorms, &c. with Jupiter's aspects are sufficiently frequent to be beyond the region of *chance*, and we, therefore, feel justified in connecting them as '*cause and effect.*'

Regarding the establishment of Jupiter's influence as a "*fait accompli*," we pass on to describe the influence of the other planets of our Solar System.

CHAPTER V.

MARS. ♂.

MARS is (about) 4,224 miles in diameter. The red appearance of the disc of this planet, and the variety of its spots render it very conspicuous. Its atmosphere is very dense. It is remarkable that Mars has no satellite. It has been said that "it is extremely probable that the singular constitution of the atmosphere of this planet compensates for the absence of a satellite."

When Mars is in 'position' or 'aspect' the effects are similar to those of Jupiter; but Mars' influence is *drier* than that of Jupiter, consequently *drought* frequently occurs under Mars' aspects. The influence generally extends over a period from two to five days before the aspect is complete, and frequently a reaction takes place immediately after.

Mars crossed the Equator on the 21st of September, 1863, and other stormy aspects coinciding, boisterous weather resulted, the barometer falling to 28·930 inches on the 22nd: hail showers on the 23rd. Similar weather occurred on the first three days of the following October, when the Sun joined both Mars and Saturn on the same day (the 2nd): (*vide* the chapter on Earthquakes.)

Mars crossed the tropic (Cancer), *i. e.* arrived at his extreme N. declination, on the 27th of April, 1863. The barometer (corrected) at the Kew Observatory, rose ·369 in. on the 23rd, and remained above 30 inches until the 28th inst. The mean temperature was *above* the average from the 21st to the 27th: and *no rain fell from the 23rd to the 29th.* A gale occurred on the 27th, Mars being 90° from Saturn.

Mars attained his extreme S. declination on the 31st of January, 1864. The barometer, which was depressed ·084 in. (at Kew Observatory) on the 28th under the *stationary* position of Saturn, rose ·504 in. (*half an inch*) on the 29th, and again ·046 in. higher

(30·470 inches) on the following day. The mean temperature rose from 34°·6 on the 30th inst. to 40°·2 on Febuary 1st, and to 45°·8 on the 3rd inst.—7° *above* the average. Strong wind on the 2nd (Mars 90° from Neptune), and a gale on the 3rd. Mr. Allnatt (of Frant, Sussex) observed "a meteor of the apparent size of a star of the first magnitude, which shot diagonally from east to west at an approximate altitude of 45°, traversing about 2° in three seconds of time. It was of a pale phosphorescent hue, and emitted no train or sound, but appeared to be one of those meteors which may be possibly generated by friction of the ozonised constituents of the atmosphere, and which melt away in their native element without explosion." This was "on the 31st of January, 1863, at $8^h\ 15^m$ P.M." The same gentleman also observed on the 1st of Febraury, "in the evening, an hour after sunset. . . . . a bright lenticular body of light, which had occasionally appeared also during the latter portion of December. It was, probably, the phenomenon described by meteorologists as the Zodiacal light, which frequently precedes the period of the vernal equinox."

The last *opposition* of Mars to the Sun took place on Oct. 6th, 1862. The mean temperature (at Kew Observatory) was *above* the average on the first nine days of the month—the excess on the 3rd inst. being *twelve degrees*. There was very little rain (one-fifth of an inch)—none at all from the 4th to the 8th. The wind was strong on the 7th. The mean height of the barometer during these nine days was 30·182 inches—being as high as 30·434 in. There was "a terrific thunderstorm" at Barbadoes on the 6th inst.

The Sun was 90° from Mars on Jan. 26th, 1863. The barometer rose ·492 in. from the 24th to the 26th, and reached its *maximum* of the month (30·464 in.) on the 28th inst. The mean temperature was 8° *above* the average on the 24th and 26th insts. Rain-fall of 7 days only ·076 in.

On April 21st, 1864, the Sun was in equal declination with Mars; and on the 26th inst. these bodies were 60° distant. From these positions we predicted, in a letter to the *Northampton*

Mercury (April 9th), "high temperature from the 21st to the 26th."

From Mr. Allnatt's letter to the *Times* on "the weather of April" we extract the following paragraphs:—

"From the 23rd to the 27th, the hygrometric state of the air was "very low, evaporation rapid, and condensation scarcely reached "dew-point. Almost every evening enormous cirri appeared in "the W. and SW., and the generation of ozone reached its "*maximum* point. On the night of the 27th there was a slight "rain-fall," (Sun 45° from Uranus) "the first that has occurred "since the 16th. The rain-falls of the month have been very "light." . . . . . "20th—Light cirri; wind SSW.; thermo-"meter 62°*, barometer 30·12 in. The thermometer exposed "to full Sun rose at 3^h 35^m P.M. to nearly 'blood heat' of "Fahrenheit."

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* *Sixteen* degrees *above* the average.

CHAPTER VI.

SATURN. ♄.

SATURN is about 78,714 miles in (mean) diameter. The mass of this planet is about 985 times the contents of the Earth.

The influence of Saturn is exactly opposite in character to that of Jupiter and Mars. His rays impart *negative* electricity; and they have a tendency to condense aqueous vapours, and thus cause rain. The temperature *falls*, and so does the barometer, when Saturn is in 'position.' Downfall—rain, hail, or snow—also occurs.

We will first instance the position of Saturn on the Equator in January and September 1863.

On the 1st of January, 1863, Saturn crossed the Equator, and again crossed it, and became *stationary* also, on the 16th inst.*

From the 25th of December, 1862, until the 24th of January, 1863, Saturn was *within five minutes of arc in declination*—being so nearly *stationary* his rays fell perpendicularly upon the Earth for a month.

The month of January, 1863, was the stormiest on record. The temperature was not low because the Earth passed between Mars and Jupiter (i.e. Mars in *opposition* to Jupiter) on the 6th; the Sun and Jupiter were 90° distant on the 16th; and the Sun was 90° from Mars on the 26th inst.

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* This singular coincidence—Saturn *stationary* on the Equator—may not occur again for a century. Saturn crosses the Equator but once in fifteen years—were he to do so more frequently there would be no question about his influence.

Results of Meteorological Observations made at the Kew Observatory, January 1863.

1863	REDUCED TO MEAN OF DAY. Barometer corrected to Temp. 32°.	REDUCED TO MEAN OF DAY. Temp. of air.	Total daily movement of wind.	Rain read at 9h. 30m. A.M.	
Jan.	Inches.		Miles.	Inches.	
1	29·876	49°.4	725	·005	Saturn on Equator.
2	29·589	42 ·1	510	.237	☉ eq. dec. ♅. ☽ ☌ ♅.
3	29·585	39 ·1	244	·008	
4	Sunday	. . .	450	·156	
5	29·039	45 ·9	459	·200	Lowest barom. of month
6	29·077	42 ·4	209	·320	♂ ☍ ♃.
7	29·268	38 ·0	177	·240	
8	29·562	40 ·0	140	·013	☉ eq. dec. ♀.
9	29·722	36 ·5	160	·008	♀ □ ♃.
10	29·678	37 ·8	512	·006	☉eq.dec.☿. ♀ □ ♂. ☿ eq.
11	Sunday	. . .	177	·096	☽ ☌ ♄. [dec. ♀, ✶ ♆
12	30·094	36 ·0	247	·016	Lowest m. tem. of month
13	29·871	41 ·1	170	·622	☿ 120° ♄, ♀ ✶ ♆. ☽ ☌ ♃
14	30·273	38 ·4	240	·051	☉ 144° ♅.
15	30·417	39 ·5	363	·008	
16	30·268	38 ·0	448	·000	♄ stat. on equa. ☉ □ ♃
17	30·111	37 ·1	285	·000	♀ 120° ♄
18	Sunday	. . .	469	·157	
19	29·461	47 ·3	537	·000	♂ 45° ♅
20	29·261	40 ·3	765	·048	
21	29·722	42 ·5	454	·010	☉ 60° ♆
22	29·766	48 ·7	529	·011	☉ 135° ♅. ☿ 135° ♄.
23	29·653	48 ·3	595	·000	
24	29·712	45 ·9	530	·056	☉ 120° ♄
25	Sunday	. . .	415	·000	
				Total	
Means	29·719	41 ·6	392	2·268	

From the above table we ascertain that, coincident with the crossing of the line by Saturn, the barometer fell considerably, it was very low on the 6th, after which date it gradually rose (under *Jupiter's* influence) till the 16th, when another fall ensued.

The temperature was below the average on the 9th and 12th. The force of wind was very great on the 1st and 20th. There was a heavy fall of rain on the 13th.

Mr. Lowe stated in the *Times* in his letter on "the weather of 1863 at the Highfield-house Observatory," that:—

"The barometer was low on the 5th and 6th, falling half an "inch on the 17th, and another half inch on the 18th, reaching "its lowest point on the morning of the 20th, and rising half an "inch during the day. Gales occurred on the 1st, 19th, 20th, "21st, 23rd, 24th, 26th, 29th, and 30th."

Results of Meteorological Observations made at the Kew Observatory, August 30th to Sept. 7th, 1863.

	REDUCED TO MEAN OF DAY.		Total daily movement of wind in miles.	RAIN.	
	Barometer.	Temp. of air.			
Aug.	Inches.			Inches.	
30	Sunday	....	576	·013	☿ on Equator.
31	29·810	56°·5		....	☉ eq.dec. ♃. ☿ eq.dec. ♄
Sep.					
1	30·045	55 ·5	203	·063	☿ eq. dec. ♆
2	29·792	53 ·3	319	·012	Saturn on Equator.
3	29·748	57 ·9	249	·196	☉ 45° ♃
4	29·856	57 ·5	215	·326	☿ ☌ ♄, ☾ ♆
5	29·709	54 ·7	296	.062	♄ ☾ ♆, ☿ eq. dec. ♂
6	Sunday	....	346	.280	☉ 30° ♀
7	29·698	56 ·7	462	·360	♀ stationary.
Means	29·808	56 ·1	381	Total 1·312	

Saturn crossing the Equator on the 2nd of September, caused a fall of ·253 in. of the barometer on that day. The equal declination of the Sun and Jupiter kept up the barometer till the 1st inst. The mean temperature was below the average on the 31st of August and the 1st and 2nd of September. The period of August 30th to September 7th was very stormy and rainy.

Mr. Lowe observed "gales on the 1st, 2nd, 6th, 7th, and 8th. Half an inch of rain fell on the 6th." (*Times*, Jan. 1st, 1864.)

The effects of the equatorial position of Saturn in September were not so marked as those in January, thus fulfilling Capt. Morrison's prediction in a letter to the *St. Leonard's and Hastings Gazette* (in January), viz.:—

"In consequence of his north latitude and retrograde motion, "Saturn will again cross the Equator at the very end of next "August; but he will not then be stationary, and his effects will "be confined to some 3 or 4 days, but as the Moon will be in "perigee on the 28th of August, there may be feared some serious "storms and high tides." On the 28th of August there was a thunderstorm in the metropolis.

The last *solar conjunction* with Saturn occurred on the 2nd of October, 1863. The barometer fell ·283 in. on the 30th of September, and again ·478 lower on the 1st of October. There were gales and heavy rain on the 1st and 2nd of October.

Results of Meteorological Observations made at the Kew Observatory, June 1863.

	REDUCED TO MEAN OF DAY.		RAIN.	
	Barometer.	Temp. of air.		
	Inches.		Inches.	
15	29·975	57°·2	·094	☿ ☌ ♅, ☽ max. dec.
16	29·932	54 ·8	·003	☽ ☌ ♅
17	29·864	58 ·7	·260	
18	29·794	58 ·6	·000	
19	29·550	54 ·6	1·246	☽ ☌ ♂. Very dark weather
20	29·790	58 ·0	·048	Sun 90° Saturn.
Means	29·817	56 ·9	Total 2·651	

On the 19th the barometer was depressed to 29·550 in., and *one inch and a quarter* of rain fell—the total rain-fall of *six* days being more than *two inches and a half*. The mean temperature was

below the average on each of the six days, being *five* degrees below on the 16th and 19th. Contrast this with the solar square of *Jupiter* on the 11th of July—when *no* rain fell in *nine* days, and the barometer was nearly *one inch higher* than on the 19th of June, and on the 15th of July the mean temperature was *eight* deg. *above* the average; and the great difference between the influences of Saturn and Jupiter, when in similar positions in regard to the Sun and our Earth, is very striking.

The next solar square (90°) of Saturn took place on the 8th January, 1864.

1st Period.—On January 1st, 1864, a frost set in which lasted until the 9th, being severe on the 6th and 7th*. There was scarcely any snow in the metropolis; but there was a heavy fall of snow at Marseilles on the 6th; and "Manhattan" said, "snow was a foot deep in New York" on January 8th, and the preceding day was "the coldest of the season." At Chicago a train was caught in a snow-storm (on New Year's day) and imprisoned. The following letter to the *Times* will give an idea of the severity of the weather:—

"Sir—I beg to enclose you the meteorological observations for the

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* To the Editor of the Times.

Sir,—The cold of the last two days has exceeded that of any day since Christmas, 1860. The following are readings of very delicate thermometers:—

	Jan. 6.	Jan. 7.
Greatest cold at 4 ft.	12·5	7·7
Ditto ditto, on the grass	4·0	1·0
Dry bulb at 10 A.M.	17·5	11·5
Wet bulb at 10 A.M.	17·0	10·5
Maximum heat	22·8	
Mean temperature	18·0	
Ditto ditto, of evaporation	16·2	

I have the honour to be, Sir,

Your obedient servant,

E. J. LOWE.

Highfield-house Observatory, January 7th, 1864.

last few days taken at this Observatory, showing an almost unparalleled amount of frost.

On Jan. 2.—Barometer stood at 30·571 in.; *maximum* temperature of the air, 28·8 deg.; *minimum* temperature on the ground, 21·8 deg.

Jan. 3.—Barometer 30·704 in.; *maximum* temperature of the air, 34·3 deg., *minimum* ditto 20·1; *minimum* temperature on the ground 19·0 deg.

Jan. 4.—Barometer 30·640 in.; *maximum* temperature of the air, 35·3 deg.; *minimum* ditto 24·1 deg.; *minimum* temperature on the ground 18·0 deg.

Jan. 5.—Barometer 30·412 in.; *maximum* temperature of the air, 32·2 deg.; *minimum* ditto 27·6 deg.; *minimum* temperature of the ground 23·3 deg.

Jan. 6.—Barometer 30·320 in.; *maximum* temperature of the air, 32·2 deg.; *minimum* ditto, 13·6 deg.; *minimum* temperature on ground, 10·8 deg.

Jan. 7.—Barometer 30·300 in.; *maximum* temperature of the air, 32·2 deg.; *minimum* ditto, 13·2 deg.; *minimum* temperature on the ground, 10·8 deg.

Thus showing a run of 3·2 deg., 11·9 deg., 7·9 deg., 4·4 deg., 18·4 deg., and 18·8 deg. of frost for the last six days. On the 5th, I exposed a pan of water to the wind S.S.E., and it froze in 3 min. 15 sec., and one sheltered from the wind froze in five minutes. I send you these observations, as they shew the great amount of cold we have had in this usually mild locality.

I am, Sir, your obedient servant,

C. G. TALMAGE."

Mr. Bishop's Observatory, Twickenham, Jan. 7, 1864.

The thaw disappointed those who had predicted a six weeks' frost. Mr. Allnatt, writing on the weather of January, said—"Thus it will be seen that no severe frosts have occurred since "the first week of this usually the coldest month of the year; "and the really ingenious theory of the author of the '*Cycle* "*of the Weather*' (an abstract of which you did me the honour "to publish in the *Times* of November 26) has so far failed of "literal accomplishment; as have those predictions also of more "recent weather prophets, whose prognostications based upon

"equally fallacious data forecast the present winter as one of "unmitigated severity."—(Letter to the *Times*, dated Jan. 31, 1864.)

The frost was more severe than any since Christmas day, 1860, when the thermometer registered *two degrees below zero*, which frost was caused, first, by the *square* aspect (90°) of Saturn to Uranus on the 15th December; secondly, the *stationary** position of Saturn on the 20th, when a great fall of temperature took place, accompanied by much snow; thirdly, the conjunction of the Moon with Uranus, and her square aspect to Saturn on the 26th (at $1^h\ 11^m$ A.M.); and, fourthly, the *trine* aspect (120°) of the Sun and Saturn on the 30th. Saturn completed the square aspect with Uranus again† on Jan. 28th, 1861—having been within half a degree of the exact square from the 15th Dec., a period of forty-four days—accordingly, "intensely cold weather set in on the 17th of December, and continued with great severity until the third week in January." (Mr. Plant's letter to the *Times*, Nov. 24th, 1863.) The mean temperature of the first eighteen days of January, 1861, was *eight degrees below* the mean of *twenty* years. Mars formed a sextile (60°) aspect with Uranus on the 17th, when the temperature rose and continued above 32 deg. for the rest of the month (excepting the 29th, when it fell to 28°, under the Sun in *trine* aspect to Uranus).

2ND PERIOD.—Feb. 7th, 1864, Sun 120° from Saturn.—Frost

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* Saturn was *stationary* also on the 24th November, 1858, when the mean temperature at Greenwich fell about *fifteen degrees below* the average.

† Saturn also formed a square aspect with Uranus on the 18th July, 1862; being within 2 deg. of the angle of 90° during the whole of May, June, July, and the first three weeks of August; accordingly those months were very wet. On the 18th July there were heavy storms—which will be noticed hereafter. The square of Saturn and Uranus is a very rare aspect, occurring but once in about twenty-one years.

commenced on the night of the 4th* and lasted until the 11th. Mr. Allnatt's observations were as follows (*Times*, March 1st):—

"5*th*.—Sharp frost, ground this morning covered with snow two "inches deep; driving wind, changing perpetually from N.N.E. to "N.W. and back. At 3. 15. P.M. a dense snow cloud (stratus) "covered the face of the sky; thermometer 34 deg; barometer "29·94 in.

"6*th*, 7*th*, and 8*th*.—Moderate frost, with slight falls of snow; "generally cloudy; wind N.E.; thermometer ranged from 29 to 34 "deg.; barometer 29·42 to 29·81 in. On the night of the 8th, at 9 "P.M. the mercury stood 3 deg. below freezing.

"9*th*.—Hard rime, which incrusted the branches of the trees. "Cloudless and misty. Thermometer at noon. 35 deg.; barometer, "29·27 in. Afternoon, dull and overcast, with haze and cirro-strati,

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* It may be well to quote the following letter to the Editor of the *Times*:—

"Sir,—The weather has been so severe in this part of the country during the last few days as to warrant some record.

Day of Month.	Barometer at 9 A.M. Inches.	Minimum Thermometer.
Feb. 5th	30·16	28°
,, 6	30 ·18	22
,, 7	29 ·94	15
,, 8	29 ·74	19
,, 9	29 ·56	11
,, 10	29 ·42	13

Notes.—5th, snow, about two inches; 6th, snow, about four inches; 7th, snow, about six inches; 8th, small quantity of snow; 9th, intense frost; 10th, more snow.

Yours truly,

H. J. L.

Wisbeach, St. Mary's, Feb. 10."

"Snow Storm.—Snow fell in heavy showers on the Northumberland coast on Sunday, and was lying 3 in. thick in some parts of the country. Between 1 and 2 o'clock on Sunday afternoon a sharp thunderstorm crossed the southern portion of the county. At night the sky had the appearance that there was likely to be more snow. There was not much wind."—*Times*, (Tuesday) Feb. 9, 1864,

"Wind W.N.W. 10 P.M.—Starlight. Thermometer 2 deg. below "freezing.

"10*th*.—Clear and frosty, ice two inches thick. Wind, E.S.E. "Thermometer, 35 deg., barometer, 29 in. Eight P.M.—Ther- "mometer 32 deg.; barometer, *which had been gradually falling* "*since the 5th*, turned, and registered 29·10 in. Wind N.E.

"11*th*.—Cloud, mist, and thaw; snow rapidly disappearing; wind "W.N.W.; thermometer 37 deg.; barometer 29·45 in.

"12*th*.—Considerable rain-fall of six hours' duration; frost and "snow disappeared; high and gusty S.W. wind, thermometer 48 "deg.; barometer 29 in., having fallen during the night 0·45 in. "At 2. 30. P.M. a dense fog suddenly arose, which lasted two hours, "when the rain ceased, and the wind shifted with great rapidity "from W.S.W. to all points of the compass; 6 P.M., rapid scud, "with warm S.W. wind; 9 o'clock, lunar corona.

"13*th*.—At 10. 20. A.M. a violent gale blew from W.S.W., and "passing over England and Scotland proved greatly destructive to "life and property on the coasts; dense cirro-stratus. 10. P.M.— "Since last night the barometer has gained nearly an inch."

From these observations we learn that Saturn's 120 deg. distance from the Sun on the 7th inst. (and the same angle being formed between the Sun and Uranus on the 10th) caused the barometer and thermometer to *fall*, and brought snow and strong wind. Then the angle of 45° being formed by Mars and Jupiter on the 12th *raised* the thermometer — hastening the effect of the solar square of Jupiter on the 15th—the barometer gaining "nearly an inch" on the 13th. The heavy snowstorms were partly caused by the conjunction of *Venus* and *Mars* on Feb. 6th.

3RD PERIOD.—The *minor* aspect of 135° between the Sun and Saturn on the 21st of February being accompanied by a "mutual" aspect between Saturn and Mars—the *square** or 90°—

* The square aspect of Mars to Saturn on 7th February, 1862, brought *down* the mean temperature (which had been considerably *above* the average for the *fortnight* previous) *twelve* degrees (at Kew), *four* degrees lower still on the 8th, and the 9th was the *coldest* day of the month—being *seven* degrees *below* the average.

on the same day, lowered the temperature again, commencing with the 19th. Mr. Allnatt's observations were as follows:—

"19*th.*—Frost, with snowstorms; thermometer 32 deg.; barometer "30 in.; 9 P.M., cloudy, with a sinking barometer; great develop- "ment of ozone.

"20*th.*—Ground still covered with snow; thermometer at noon 2 "deg. below freezing; brisk east wind, with much ozone; barometer "falling.

"21*st.*—Freezing; dense snow cloud, with occasional falls during "the day. 9 P.M.—Sleet; thermometer 30 deg.; barometer 29·34 in.

"22*nd.*—Ozone almost *nil.* Cloudy; wind S.S.E., thermometer "32 deg. On the morning of the 23rd the ground was again sheeted "with snow; wind N.E.

"24*th.*—At 6 A.M. long flexuous, diverging streaks of cirri in N.W.; "cloudy and frosty, with cold N.E. wind. 2. 30 P.M. Heavy snow- "storms, ozonoscope almost at *maximum* degree of intensity."

"25*th.*—Fall of snow of about 2 in. gradually melting; wind "E.N.E.; thermometer 38; barometer 29·70 in.; dense *cumulo-* "*stratus.*

"26*th.*—Thaw, dense fog; wind N.E.; snow entirely disappeared; "thermometer 39 deg."

On the 22nd the amount of ozone was "almost *nil*," when Saturn's influence on our atmosphere predominated; then on the 24th the ozonoscope was almost at the *greatest* degree of intensity—*Mars* forming with the Sun the angle of 45°, Venus being 60° from Jupiter—and the frost disappeared.

The following telegram appeared in the *Daily Telegraph* of February 23rd, 1864:—"GREAT FALL OF SNOW IN FRANCE—PARIS, Feb. 22. Telegrams received here announce that enormous quantities of snow have fallen in the departments of Herault, Aude, Ardeche, Rhone, and Drome, and that the railway traffic is interrupted in consequence." The *Paris* correspondent of the *Times* wrote that,—

"A letter from Port Vendres of Tuesday last states, that snow has "fallen there for the first time within 15 years. It fell in large "quantities during the night of the 19th, and the entire of the 20th. "All the mountains in the neighbourhood present a white appear-

"ance, and the quays of Port Vendres are covered to the depth of "18 inches.

"Advices from the Haute-Loire of Monday last state, that the "weather had again become dreadful, and that all communication "with Paris had been interrupted during the previous 40 hours. "Snow, which had fallen in large quantities from the previous "Friday, had rendered all traffic impossible in the streets of Puy. "On the road from Puy to St. Etienne and Brioude snow lay five "feet deep, while immense heaps were collected in the fields by the "storm which prevailed. The villages of Pradelles and Fix were "nearly buried in the snow . . . . . That country had frequently "experienced snow-storms, but none so violent as the last. . . . The "Paris railway-train, which should have reached Brioude at 8 o'clock "on Sunday morning, was unable to pass through the gap of the "Allier, in consequence of the heap of snow on the rails."

4TH PERIOD.—The equal declination of the Sun and Saturn on the 10th March, 1864 (followed next day by the solar square of Uranus), again lowered the temperature, &c. The report of the Registrar-General (*Times*, March 17th, 1864), for the week ending March 12th, concluded as follows:—

"At the Royal Observatory, Greenwich, the mean height of the "barometer in the week was 29·252 in. The mean daily height was "below 29 in. on the first four days. The reading fell to 28·81 in. "on Monday, and rose to 30·06 in. on Saturday*. The mean tem- "perature of the air in the week was 41·5 deg., which is 1·3 deg. "above the average in the same week in 43 years (as determined by "Mr. Glaisher). The mean daily temperature was 6 deg. above the "average on Monday†, and as much *below* it on Wednesday. The "highest day temperature was 53·6 deg. on Sunday. The lowest "night temperature occurred on Thursday, and was 27·9 deg. The "mean daily range was 12·4 deg. The difference between the "mean dew-point temperature and air temperature was 4·7 deg. "The mean degree of humidity of the air was 84, complete satura- "tion being represented by 100. The wind, which had been pre-

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* Under Jupiter *stationary* on the 13th.

† Under Mars 60° from Jupiter on the 5th, and Mercury 90° from Jupiter on the 8th of March.

"viously in the south-west and north-east, blew on the last three "days from a south-westerly point. Rain fell to the amount of 1·54 "in., of which as much as 0·62 in., including melted snow, fell on "Wednesday. The mean of the highest temperatures of the water "of the Thames was 43·7 deg.; that of the lowest was 41·6 deg."

These facts need little comment. The great depression of the barometer on the 7th (28·81 in.); and the fall of temperature to *six* degrees *below* the average on the 9th, and a fall of snow and rain on that day of 0·62 in. are incontrovertible evidences of Saturn's influence. Compare the rain-fall of the week (1·54 in.) with that of the following one (0·06 in.) under Jupiter's aspects, and who can doubt the influence of either planet on the weather?

The heavy rains so overcharged the Bradfield reservoirs, near Sheffield, which were not strong enough to resist the extra pressure put upon them, that the waters rushed forth in such volumes that Sheffield was inundated on the early morning of the 12th inst., and 250 lives lost.

We extract the following paragraph from the *Times* of Friday, March 11th, 1864:—

"The INUNDATION IN NOTTS.—NOTTINGHAM, Thursday.—Snow fell here without intermission the whole of yesterday, and at night a severe frost set in. The floods on the Trent have not subsided, the height of the water being only about a foot and a quarter below the water-mark of the great flood of 1857. . . . . The roads are quite impassable in some districts, and if farmers and others have to transact any special business from village to village they have to go either in small boats or in carts for their safety. . . . On Wednesday morning, about 5 o'clock, a snow-storm came on with great suddenness upon the Northumberland coast. At 8 o'clock, when the snow ceased, it was lying four inches deep in the neighbourhood of Shields."

In Mr. Allnatt's summary of the weather of March (dated the 30th inst.), in the *Times*, we find:—

"10*th*, 8 A.M.—Frost; ground covered with snow 2 in. deep; "during the day the wind was S.W., and there were occasional "snow-storms, mingled with rain; barometer 29·30 in., having risen

"since yesterday one inch; 11 P.M. long cirro-nimbi, and opposing "currents, betokening wind. . . . In the first division of the month, "from the 1st to the 8th, the atmosphere was foggy, damp, and mild, "with almost complete hygrometric saturation on the 6th. The ther- "mometer ranged from 42 to 56 deg., the barometer from 28·50 to "29·50, or 1 inch. The greatest depression was on the 7th, when "a boisterous S.W. gale raged for many hours, accompanied by a "heavy rain-fall. Average development of ozone 5·4 deg.; mean "thermometric registry, 47·1 deg.; mean barometric 29·30 in. "Wind southerly six days, the remaining two, touched the north. "Rain on five days, fog and cloud on three."

5TH PERIOD.—Saturn was again in equal declination with the Sun on the 29th March, 1864: and Mars was 120 deg. from Saturn on the same day.—The report of the week ending April 2nd, was that,

"At the Royal Observatory, Greenwich, the mean height of the "barometer in the week was 29·439 in. The reading fell to 28·93 "in. on Monday" (the 28th March), "and rose to 29·85 inches on "Saturday." (Sun 135° from Jupiter). "The mean temperature of "the air in the week was 41·0 deg., which is 2·2 deg. *below* the "average of the same week in 43 years. The lowest night tempe- "rature was 28·9 deg. on Sunday. The highest day temperature was "54·4 deg. on Saturday. The range in the week was 25·5 deg. . . . "The whole amount of rain was 0·42 in., which fell on three days. "There were occasional hailshowers, and thick snow fell early on the "morning of Wednesday."

Mr. Allnatt's observations were:—

"28th, dense cirro-stratus; wind from N.E. to W., rapidly "changing; barometer, 29 in.; ozone 9 deg.; 9 P.M. bright equatorial "light at the point of sunset in the western horizon, and several "flashes of distant lightning at 9·30; ground covered with hail. "29th.—Dense cirro-stratus; fresh wind, N.E. to S.W., and back; "showers of hail; thermometer, 40 deg.; barometer, 28·70 in. 30th, "8 A.M.—Ground covered with snow an inch deep, which soon "dissolved; wind from S.W. to N.E.; ozone 10 deg.; afternoon, "fog and rain; 6 P.M., heavy cumuli; barometer slowly rising; "thermometer, 46 deg.; occasional showers of rain, mixed with "hail; ozone slip gradually colouring."

6TH PERIOD.—Sun in opposition to (180°) Saturn, April 4th, 1864.

"At the Royal Observatory, Greenwich, the mean height of the "barometer in the week"—ending April 9th, 1864—"was 30·023 in. "The mean daily reading was above 30 in. on the last five days. "The reading fell to 29·71 in. on Sunday, and rose to 30·24 in. on "Friday. The mean temperature of the air in the week was 44·5 "deg., which is 0·7 deg. *below* the average of the same week in forty- "three years. The highest day temperature was 61·4 deg. on Mon- "day. The lowest night temperature was 35·0 deg. on Wednesday. "The range of temperature in the week was, therefore, 26·4 deg. The "mean degree of humidity of the air was 81, complete saturation "being represented by 100. Rain fell on the first four days of the "week; the whole quantity 0·63 in. The direction of the wind was "variable; south-west, north-east, south-east, and again south- "west."—(*Daily Telegraph*, April 13th, 1864.)

The barometer was low on the day before the opposition (which took place early in the morning of the 4th), and the temperature rose rapidly as soon as the Earth had passed between the Sun and Saturn, but it fell again *fifteen* degrees on the 5th, and there was heavy rain all day in London (0·47 in.), and hail also; and snow on the 6th. The *Paris* correspondent of the *Times* said that, "the weather continues to be very severe "in the Mediterranean. Several mail steamers are due at Mar- "seilles, and the mail from Constantinople arrived there on the "2nd inst., two days behind her time. She experienced a very "heavy sea."—(*Times*, April 7th, 1864.)

A telegram from Halifax (Nova Scotia), dated April 2nd, 1864 (10 P.M.) says, "Since leaving Boston the *Arabia* has had continuous easterly gales. A heavy and long spell of easterly winds has driven the ice from North Bay, and scattered it profusely along the south coast. The harbour of Halifax has been blocked up for two days by a heavy field of ice, extending east and west as far as the eye could reach." The *Arabia* arrived at Queenstown at 9 P.M., April 12th, 1864, having "experienced very severe easterly gales."—[*Daily Telegraph*, April 13th, 1864.]

These gales were not much felt in the British isles. There

was "heavy" wind at Portsmouth, and at Penzance, March 31st, and again on April 1st; and "strong" wind on April 3rd at the latter place. "Manhattan," in a letter dated, New York, April 5th, said, "for two weeks we have had, day after day, a continuous storm of such severity as was never known in this month . . . . This morning it looks as if we should have more rain"; and, again, April 6th, 10 A.M. "The weather is still very severe, with a high wind."—[*Evening Standard*, April 19th, 1864.]

The prevalence of *easterly* gales on the Atlantic at this period agrees with the aphorism, that "Saturn rules easterly winds*."

7TH PERIOD.—Sun 120° from Saturn, June 1st, 1864.

"At the Royal Observatory, Greenwich, the mean height of the "barometer in the week"—ending June 4th—"was 29·698 in. "The reading rose to 29·87 in. on Sunday" [Sun 60° from Neptune], "and fell to 29·58 in. on Tuesday. The mean temperature of the "air in the week was 5·9 deg. *below* the average of the same week "in 43 years. The mean daily temperature was below the average "throughout the week. On six days it was about 6 deg. and "7 deg. below the average. The lowest night temperature was "33·4 deg. on Monday; the highest day temperature was 68·4 "deg. on Saturday. The range of temperature in the week was "therefore 35 deg. The mean daily range was 18·2 deg. On "Monday the range was 28·6 deg. On Friday it was only 8·2 "deg." [Mars on Equator, and 135° from Jupiter.] . . . . . "The "wind was for the most part in the south-west till Tuesday after- "noon, when it changed to north-east, from which point it blew "chiefly till the end of the week. The rain-fall was 0·78 in., "nearly all of which was on Tuesday and Friday."—*Times*, June 9th, 1864.

Mr. Plant, of Birmingham, wrote to the *Times* on the "severe frost on the 1st of June," saying:—

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* In a letter to the *Northampton Mercury* (February 6th, 1864), we wrote as follows:—"On the 3rd of April next, there will be a solar (superior) conjunction of Mercury, and on the 4th, a solar opposition of Saturn, which will bring gales and downfall, and may retard vegetation at that period."

"I have now to record a frost of greater importance than any before registered here in the month of June.

The following are my readings of instruments this morning :—

Register Thermometers.

	4 ft. above ground.	On grass.	Highest in shade in 24 hours.
June 1.....	31 deg.	23 deg.	54 deg.

The mean is 14 deg. *below* the average for the 1st of June in 28 years."

The *Times* of June 15th, 1864, contained the following telegram from New York :—

"June 4th, 11 A.M. Mr. Stanton announces that a violent storm "occurred on the Peninsula on Thursday night" [the 2nd inst.] "which has interrupted telegraphic communication, and prevented "the receipt of later intelligence from Grant."

The range of temperature is generally great when Saturn is in conjunction with the Sun. The following paragraph is extracted from No. V (Jan. 1, 1862) of the *Record* of the Astro-Meteorological Society.

According to the observations of Luke Howard*, we find that the yearly range of the temperature about London varies from about 60° to 86°, the average being 73°. Now, if this be the *yearly* amount, we may fairly expect the weekly amount to be very much less ; which it is in reality. But if we examine the range of the thermometer, as recorded by the *Secretary* of the Astro-Meteorological Society during each of the ten weeks, within the last ten years, when the Sun has passed Saturn, we find the maximum range during any of those weeks has been 33°, and the minimum 21° ; so that the average range has been 27°. This may be taken as pretty positive proof that during the periods of those conjunctions the atmosphere is much more agitated and deranged than at other times ; which proves the *fact* of the influence of the planets.

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* Lectures, p. 42.

Range of Temperature ☉ ♂ ♄ in 7 days.

DATE.							
1852, April	27th	from	36°	to	65°	=	29° range.
1853, May	12th	—	36	to	56	=	24
1854, May	26th	—	32	to	54	=	22
1855, June	10th	—	50	to	71	=	21
1856, June	25th	—	51	to	84	=	33
1857, July	9th	—	49	to	81	=	32
1858, July	25th	—	52	to	74	=	22
1859, August	8th	—	50	to	76	=	26
1860, August	22nd	—	44	to	66	=	22
1861, September	5th	—	46	to	76	=	30.

Max. range = 33°
Min. range = 21

2)54
27 = Mean weekly range.

CHAPTER VII.

VENUS. ♀.

VENUS is 7,524 miles in diameter. The orbits of Venus and the Earth do not coincide, therefore "a transit of Venus over the Sun's disc" does not occur at every solar conjunction. The last transits of Venus took place in the years 1761 and 1769. The next transits will take place (4^h 8^m A.M.) December 9th, 1874, and (4^h 17^m A.M.) December 6th, 1882. The planetary distances were ascertained from the transits of Venus in the years 1761 and 1769; previous to those years the distance of the Earth from the Sun was stated, or supposed, to be about 82 millions of miles, a difference of about 13 millions of miles (nearly one-seventh part) from the so-called "true" distance—95 millions of miles. But, as we have mentioned at page 25, *four* millions of miles are now subtracted from the "true" amount, and M. Le Verrier states that the distance is about 91 millions of miles. *The* "true" distance cannot be satisfactorily determined till the next transit of Venus over the Sun's disc shall take place—ten years hence; the calculations of the only gentleman who really saw the last transit being said to be untrustworthy. It is a difficult matter to *see* a transit of Venus, because—as we shall presently shew—*cloudy or rainy weather* invariably prevails when solar conjunctions of Venus occur.

Venus's arc of greatest elongation from the Sun never exceeds 48°. Then, as the Sun moves (apparently) in the heavens, at the rate of 15° per hour, Venus can never be seen more than 3^h 15^m before sunrise or after sunset.

Venus is about ·86 of the contents of the Earth; the light and heat she enjoys are about 1·9 times more than the amount received by the Earth.

Copernicus predicted long before the invention of the telescope, that the *phases* of the inferior planets—Venus and Mercury—would some day be found to be similar to those of the Moon. Galileo discovered these phases in 1611 by means of his astronomical tube—the telescope.

The general character of the weather when Venus is in conjunction, &c. with the Sun, and when she crosses the Equator and the tropics, is cloudy and rainy; in winter it is frequently misty or foggy—especially if she aspect Saturn at the same time; and when the temperature is low, *snow* falls.

Venus crossed the Equator May 9th, 1862. At Kew the barometer fell from 29·904 in. to 29·612—(or 292 in.), on the 10th it was registered at 29·618 in., and on the 12th, 29·610 in. The relative humidity of the air on the 8th, was ·78, on the 9th, ·94, and on the 10th ·82. The *rain-fall* registered on the 7th, was ·756 in., 8th, ·727 in., 9th, ·620 in., making a total in *three* days of 2·103 inches—nearly *two-thirds* of the whole rain-fall of the month.

Venus again crossed the Equator, October 11th, 1862. Barometer on the 10th, 30·054 in., 11th, 29·848 in., 13th, 29·835 in., 14th, 29·855 in., 15th, 29·683 in. Relative humidity of air, 9th, ·81, 10th, ·91, 11th, ·89. *Rainfall*, 10th, ·000 in , 11th, ·608 in., 12th, ·147 in., 13th, ·158 in.—total, ·913 in. in three days—*more than half an inch* falling on the 11th. There was a thunderstorm on October 11th, 5^h A.M. in the metropolis; and a waterspout, in the afternoon of the same day, "burst over the commune of "Brignac, in the canton of Clermont-l'Herault. In less than ten "minutes, the plain of Salamane was transformed into an extensive "lake, the waters rising to a height of more than a metre. . . . . "Several persons, surprised by the fall of this diluvian torrent, "were compelled to take refuge in trees, and upon the walls which "border the roads and private properties. Within the memory of "man no such event had taken place in the neighbourhood, conse- "quently, all the inhabitants of the commune assembled after the "storm on the road from Brignac to Clermont, to discuss the effects "of the waterspout, which may be considered as a really remark-

"able meteorological phenomenon."—*Galignani.* [*Standard*, October 18th, 1862.*]

Venus again crossed the Equator August 4th, 1863. The barometer on the 1st inst., was 30·059 in., 3rd, 29·997 in., 4th, 29·875 in., 5th, 29·865 in. Relative humidity of air on the 1st inst., ·59, 3rd, ·72, 4th, ·82. Rain-fall on the 3rd, ·000 in., 4th, ·007 in., 5th, ·157 in., 6th, ·137 in.—total, ·301 in. in three days.

Venus again on the Equator April 17th, 1864. "At the Royal Observatory, Greenwich, the mean height of the barometer in the week," ending Saturday, April 16th, "was 29·800 inches. The reading was 30·05 inches on Sunday, and fell to 29·54 inches on Friday." After a week's fine and dry weather, Saturday and Sunday (the 16th and 17th instants) were wet. The rain-fall registered on Saturday, at 8^h A.M. was, in London, 0·04 in., Nairn, 0·37 in., Aberdeen, 0·35 in., Leith, 0·20 in., Galway, 0·27 in., Liverpool, 0·18 in., Holyhead, 0·10 in., Weymouth, 0·48 in., Portsmouth, 0·09 in., Dover, 0·45 in., and at Shields, 0·85 in.—total rain-fall at 12 stations 3·41 in. And the rain-fall registered at 8^h A.M. of Monday, April 18th, was, at Aberdeen, 0·45 in., Greencastle, 0·12 in., Galway, 0·20 in., Valentia, 0·10 in., Weymouth, 0·48 in., Portsmouth, 0·67 in., London, 0·08 in., Scarboro', 0·52 in.;—total of eight stations, 2·62 in. The weather was very rough in the Channel on Saturday, the 16th inst. A gentleman who crossed from Weymouth to Jersey on that day wrote to the author as follows:—

"Jersey, Sunday, April 17th, 1864. I arrived here safely last evening after a terrific passage. Wind N.W., bitterly cold. Captain and sailors said it had not been colder all the winter. Rained all the morning—'heavens hard' for four hours†." The weather cleared up again on Monday in London and continued settled, fine, and dry for eight days afterwards.

* The opposition of Mars and Jupiter on the 12th inst. (which day was very wet and stormy) helped to produce this "phenomenon."

† This interruption of the extraordinary fine, dry, and hot weather was predicted by the author (in the *Northampton Mercury*) in the following words. "Venus on the Equator on Sunday next (the 17th inst.) will bring rather heavy April showers."

Mr. Allnatt, in a letter to the *Times* dated April 18th, said,

"We were again visited last night (Sunday) by a beautiful and extensive aurora. . . . At 10h 30m the face of the whole heavens was overspread by a broad lenticular body of light, and undulating streamers, which shot in great profusion in all directions, describing various angles, acute and obtuse, and presenting altogether a varied and beautiful appearance."

And in a letter to the *Times* (May 3rd, 1864), on "the weather of April," Mr. Allnatt said,

"15th.—Fair and mild; wind, S.S.E.; thermometer, 54 deg., "having risen since yesterday 18 deg.; barometer, 29·85 in.; "gradually falling. 11 p.m., a dark cloud drifted over, which was "immediately followed by sudden condensation and thick fog. "16th.—Fog and rain; wind S.W.; thermometer 52 deg.; baro- "meter 29·80 in.; ozone abundant. 17th.—Fog and light cumuli; "restless wind N.E. to N.W.; 2h 30m P.M., double stratum of cloud, "upper of light cumuli, lower dark thunder clouds moving simul- "taneously in the same direction; ozone 10 deg."

The solar conjunction with Venus of May 11th, 1861, produced heavy rain-falls, and a falling barometer in all parts of the kingdom. The prediction in the *Record* of the A. M. Soc. (No. II, April 1st, 1861) was as follows:—"The conjunction of the Sun "with Venus on the 11th denotes a rainy period about that "day; dashing showers frequent."

The last solar conjunction with Venus took place September 28th, 1863. The barometer at the Kew Observatory on the 26th was registered at 30·074 in.; 28th, 29·834 in. Rain-fall on the 26th, ·009 in., 27th, ·014 in., 28th, ·204 in., 29th, ·056 in. September 6th, 1863. Sun 30° from Venus. 7th, Venus *stationary*. —The barometer at the Kew Observatory stood at 29·856 in. on the 4th; 29·709 in. on the 5th; 7th, 29·698 in. Rain-fall on 5th inst., ·062 in., 6th, ·280 in., 7th, ·360 in.—total, ·702 in. in three days, or ·640 on the 6th and 7th.

When Venus is in aspect to Jupiter the temperature *rises*, and there is *dry* weather. On the other hand, when Venus is in aspect to Mars there is *down-fall*. When in aspect to Mercury there is fog or downfall.

CHAPTER VIII.

MERCURY. ☿.

THE planet Mercury is rarely visible, because of its proximity to the Sun, and its small size. It is never more than 28° distant from the Sun, and therefore forms no *aspects* with that body, except the *conjunction* and *equal declination*. It is not visible more than 1 hour 15 min. before or after the Sun rises or sets. Its orbit being within that of the Earth it is called an *inferior* planet.

Mercury is styled by astro-meteorologists an *electric* planet *par excellence*. It is observed that when this planet is in conjunction with the Sun the atmosphere is greatly disturbed, the barometer and thermometer *fall*, and the wind is strong—in winter hurricanes sometimes occur, as that of December 2-3-4, 1863, which commenced at the period of the solar (superior) conjunction with Mercury (Dec. 1st, $11^h\ 38^m$ P.M.).

The heavy gale of Jan. 12th, 1862; the hurricane of May 6th, 1862; the "terrific storm and waterspout in Spain," August 19th, 1862; and the severe gales on the Atlantic April 3rd, 1864, having occurred at periods of solar conjunctions with Mercury, are coincidences too numerous to be within the range of chance.

The following table shews the variations of the instruments at the Kew Observatory, from November 30th to Dec. 5th, 1864. The *trine* aspect of Venus and Uranus on the 2nd inst. increased the fall of rain; and the Moon on the Equator on the 4th, and Mercury in *aphelion* in equal declination with Uranus on the same day, and 60° from Saturn, and 30° from Jupiter on the 5th enhanced the force of the hurricane.

Results of Meteorological Observations made at the Kew Observatory.

	Reduced to mean of day.		RAIN	WIND	Total daily movement of wind in miles	ASPECTS.
	Barometer corrected to Temp. 32°.	Temp. of air.	read at 9h 30m A.M.	At 9·30 A.M. 2·30 P.M. and 5 P.M. respectively.		
Nov.	Inches.		Inch.			
30	30·117	36°·5	.015	E, NNE, NNE		
Dec.						
1	29·696	47 ·2	·006	SSE, S, S by W	362	☉☌☿
2	29·122	47 ·7	·211	S, WNW, W by N	479	♀ 120° ♅
3	29·329	43 ·3	·675	W, SW, W by S	748	
4	30·358	41 ·4	·006	WSW, SW, S by W	316	☿ eq. dec. ♅
5	30·105	49 ·0	.000	SW, SW, SW	449	☿ ✶ ♄, 30°♃
			Total			
Means	29·788	44 ·2	·913			

The above table shews that the barometer fell *half an inch* on Dec. 1st, and *half an inch* lower still on the 2nd inst. At Liverpool the "pressure of wind = 43lb. (on Thursday)," the 3rd inst., and in London the "extreme wind at Lloyd's, 30lb. on foot," on the same day.

Mercury crossed the Equator on April 8th, 1863. The barometric registrations at the Kew Observatory were:—April 2nd, 30·107 in., 4th, 29·947 in., 6th, 29·578 in., 7th, 29·491 in., 8th, 29·656 in., 9th, 29·775 in., 10th, 29·749 in., 11th, 29·835 in. No rain was registered on the first four days of the month, on the 5th the rain-fall was ·025 in., 6th, ·006 in., 7th, ·050 in., 8th, ·010 in., 9th, ·083 in., 10th, ·034 in. On the 7th inst. the mean temperature was 10°·5 *below* the average. On the 8th inst. 3° below. There was a heavy gale of wind on the 6th inst., which continued at intervals until the 9th.

Mercury was again on the Equator on August 30th, 1863. On the 25th inst. the barometer fell to 29·551 in. (at Kew Observatory), 26th, 29·467 in., 27th, 29·408 in., 28th, 29·639 in., 29th, 29·753 in., 31st, 29·810 in. The fall of rain from the 26th to

30th inst. (inclusive) exceeded *one inch*. There was a thunder-storm in the metropolis on the 28th inst., and a heavy gale on the 30-31st instants. On the 29th and 31st instants the mean temperature was 7° and 8° *below* the average.

Mercury on the Equator, March 29th, 1864. The barometer on the 28th inst. at the Kew Observatory was registered at 29·285 in., 29th, 29·352 in., 30th, 29·562 in., 31st, 29·751 in. Rain-fall 28th, *nil*, 29th, ·162 in., 30th, ·240 in., 31st, ·034 in. There was a hail-storm on the 29th. A violent gale at Penzance and Shields on 28th, also on the 29th at Penzance, Brest, Plymouth, Weymouth, London, and Dover. The mean temperature was 5° *below* the average on the 29th.

Mercury at extreme S. declination Dec. 17th, 1863, stirred up a gale of wind. "The barque *Highbury*, of Shields, came on shore "upon the rocks at the Castle foot, Scarborough, between six "and seven o'clock yesterday morning. . . . . The awful "violence of the storm may be judged of from the fact that not a "vestige of the ship remained two hours after the occurrence."—*Times*, Dec. 18, 1863.

CHAPTER IX.

URANUS. ♅.

THE planet Uranus was discovered by the late Sir William Herschel, at Bath, on the evening of March 13th, 1781. This planet was once called "the Georgium Sidus," or *Georgian* Star, in honor of King George III. It has also been called *Herschel*—in compliment to the discoverer of it—but it is now named *Uranus*.

The mean distance of Uranus from the Sun is almost twice that of Saturn. It is about 91 times larger in its cubic contents than the Earth.

Uranus is found to act in a sudden manner on our atmosphere, when in aspect. Its influence is not so great as that of Saturn, Jupiter, Mars, and Venus. It acts in a similar manner to Saturn, Venus, and Mercury combined. When in aspect to the Sun, the weather is generally *windy, rainy, and cold.* When the Moon passes Uranus the barometer is almost invariably *low.* When Jupiter is in "mutual" aspect with Uranus, thunder and lightning occur in summer*, and in winter the force of wind is strong.

Mars in aspect to Uranus generally brings gales and rain. The conjunction of these two bodies on 7th April, 1863, was attended by a heavy gale and rain-fall. Mars 60° (*sextile*) from Uranus, July 22nd, 1863, brought storms of rain. And there was a heavy thunderstorm in the metropolis at 10^h 15^m P.M. Sept 9th, 1863, a few hours before Mars came to the *square* aspect (90°) with Uranus†.

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* A thunderstorm visited the metropolis August 28th, 1863, when Jupiter and Uranus were in *trine* aspect.

† According to a letter in the *Standard*, Sept. 12th, the lightning was visible at Weston-Super-Mare (125 miles distant). And "several "casualties were reported to have occurred through the effects of the violent "thunderstorm. In a field between Hendon and Hampstead, three cows "were killed. At Edgware a valuable horse was struck dead while "drawing a waggon. In two or three instances persons were struck by "the electric fluid and rendered insensible."—*Standard*, Sept. 11, 1863.

The *opposition* of these planets, Jan. 16th, 1864, was marked by a gale of extreme force at Galway and Cape Clear. Another striking instance of the influence of this position was the occurrence on Jan. 24th, 1862, of a heavy gale attended with thunder and lightning, and heavy rain. We may also mention the *conjunction* of Uranus and Mars on April 27th, 1859, and on April 17th, 1861; the *opposition* on August 19th, 1856, and Feb. 6th, 1860; and the *square* aspect on Oct. 3rd, 1855, Jan. 3rd, 1857, Dec. 6th, 1860, Sept. 15th, 1861, and June 13th, 1862—all of which aspects were attended by heavy gales or storms of wind.

The year 1863 opened with the Sun and Uranus in equal declination (and Saturn on the Equator), and the Moon in conjunction with Uranus on the 2nd January, accordingly gales and rain marred the *jour de l'an*.

2ND PERIOD.—February 23rd, 1863, Uranus *stationary* (Mercury being also *stationary* on the 22nd) was attended by a severe snow-storm on the Rappahannock, the average depth of snow being 7 inches. And "accounts from San Francisco, by "transcontinental telegram to New York, dated February 24th, "state, that a violent tempest had prevailed on the coast of "California, from the 21st to the 24th of February, and had "caused the loss of several coasting vessels and many lives." The Moon passed Uranus on the 26th. "Manhattan" wrote from "New York, Feb. 27th. A rain has been drizzling for "two days. It has spoiled the sleighing, and made it difficult "to travel the streets. To-day the fog is so dense that it can be "almost cut with a knife."

3RD PERIOD.—March 7th, 1863 (the day on which the beloved Princess of Wales passed in procession through London), the Sun was in *square* (90°) aspect to Uranus.—The barometer at the Kew Observatory on the 6th registered 29·426 in., 7th, 29·514 in., 9th, 29·517 in. The rainfall of the 7th, was ·070 in., and on the 8th ·224 in.

4TH PERIOD.—April 7th, 1863. Sun 60° from Uranus.—Gales and rain.

5TH PERIOD.—June 12th, 1863. Sun in *conjunction* with

Uranus. 13th, Sun in *equal declination* with Uranus (and in *conjunction with Mercury*). — Thunderstorms. On the 13th inst. "a storm of a serious character visited Welbeck Abbey, the seat "of the Duke of Portland. At about six minutes past one "o'clock (noon) when the storm was at its height, a thunderbolt "descended upon the tower, striking it with such force that the "four-dial clock was completely demolished, and old Welbeck's "tower split down, the report of thunder and the fall of the old "pile alarming the workmen and inhabitants to such a degree "that they imagined the whole building was coming to the "ground."—*Daily Telegraph*, June 16th, 1863.

6TH PERIOD.—August 17th, 1863. Sun 60° from Uranus.—Barometer depressed (at the Kew Observatory) to 29·694 in. Stormy weather. "A violent hurricane along the American coast line from the 18th to the 22nd inst." At Kew the mean temperature on the 15th was 68°·8, but it fell to 57°·9 on the 17th, 55°·0 on the 18th, and 53°·0 on the 19th—8° *below* the average.

7TH PERIOD.—September 18th, 1863. Sun 90° (*square*) from Uranus.—Heavy gale on the 19th.

8TH PERIOD.—October 18th, 1863. Sun in *trine* (120°) to Uranus.—Gale at Queenstown, Nairn, Aberdeen, Galway, Holyhead, Penzance, Plymouth, Portsmouth, London, and Heligoland.

9TH PERIOD.—Sun in *opposition* to Uranus, December 15th, 1863, and in *equal declination* to the same planet on the 18th inst. —On the 16th the barometer fell *half an inch* (at Kew Observatory). Gales from the 15th to the 18th.

10TH PERIOD.—February 10th, 1864. Sun in *trine* aspect (120°) to Uranus. The barometer (at Kew) fell to 29·443 in. There was a snow-storm in the metropolis on the 11th morning. The mean temperature was 8° below the average.

11TH PERIOD.—March 11th, 1864. Sun in *square* (90°) to Uranus.—Gale at Liverpool (extreme pressure = 30lb. on foot), Aberdeen, Galway, Dover, &c. Barometer at Kew Observatory 29·555 in.

Venus in aspect to Uranus frequently produces heavy rains. The mutual *trine* (120°) of these planets on the 2nd of December,

1863, was attended by dashing rain. The *opposition* on the 24th January, 1864, brought heavy rain during the preceding night in the metropolis: but the Sun being in *sextile* aspect to Neptune on the 24th, the weather then cleared up.

Mercury's 'mutual' aspects with Uranus produce, more or less, wind.

12TH PERIOD.—Sun 60° from Uranus. April 11th, 1864.—The influence of Uranus was on this occasion completely overpowered by the aspects of Jupiter and Mars (*vide* p. 45).

13TH PERIOD.—Sun in *conjunction* with Uranus, June 16th, 1864.—The Registrar-General's report of the weather during the week ending June 18th, 1864, was as follows:—

"At the Royal Observatory, Greenwich, the mean height of the "barometer in the week was 29·670 in. The reading fell to 29·35 "in. on Tuesday" [Saturn *stationary*], "and rose to 29·99 in. on "Saturday. The mean temperature of the air in the week was "57·8 deg., which is 1·2 deg. *below* the average of the same week "in 43 years. The lowest night temperature was 45·1 deg. on "Tuesday, the highest day temperature was 74·1 deg. on Thursday" [Moon *conjunction* Jupiter]. "The range of temperature in the "week was, therefore, 29 deg. . . . . The wind blew from the "south-west. There was rain on three days, the whole of which "was 0·23 in. On Monday and Wednesday the showers were "accompanied by thunder."—*Standard*, June 23rd, 1864.

A telegram, dated Lisbon, June 15th, appeared in the *Times* of June 16th, 1864, stating that, "very stormy weather has been experienced along the Portuguese coast."

Thus was fulfilled our prediction (in the *Northampton Mercury*) that the weather from the 11th to the 16th would be "very unsettled—*dashing showers* or hailstorms, with fair intervals." Hail fell (in London) on the 15th.

CHAPTER X.

NEPTUNE. ♆.

NEPTUNE is the most distant of the (discovered) planets in our solar system. This planet was discovered by Mr. Adams and M. Le Verrier in 1846. Its distance from the Sun is about 2,862 millions of miles. It is 164 years completing its revolution round the Sun—at the rate of 12,500 miles per hour.

The observations of astro-meteorologists lead to the belief that Neptune's influence is *dry* and *warm*—probably stormy.

Neptune crossed the Equator May 15th and August 22nd, 1862; March 15th, November 25th, and December 28th, 1863.

1ST PERIOD.—May 15th, 1862. There was a gale of wind, and ·150 in. of rain; on the 16th, ·456 in. of rain (due to Saturn *stationary* on the 18th inst.).

2ND PERIOD.—August 22nd, 1862. There was ·016 in. of rain registered on this day (the Sun in equal declination with Mercury on 23rd inst.) but the weather was *generally* fine and dry from the 20th to the 31st (inclusive).

3RD PERIOD.—March 15th, 1863. Brisk wind. Rain ·241 in. from the 13th to 17th inst. (inclusive). Two 'wet' aspects (☌△♄, and ♀ ✶ ♅) were formed on the 14th and 15th insts. Barometer low under these influences, but it rose rapidly on the 15th, 16th, and 17th, under Neptune's influence.

4TH PERIOD.—Nov. 25th, 1863. The rain which fell under Saturn's influence on the 22nd, 23rd, 24th, and 25th, ceased when Neptune crossed the Equator, and the weather was fine and dry to the end of the month (the Sun 120° from Neptune on the 27th inst.). Barometer rose ·205 in. on the 25th, and remained above 30 inches till the 1st of December. Mean temperature 9° *above* the average on the 24th and 25th insts., and continued above till the 28th inst.

5TH PERIOD.—December 28th, 1863. Weather *dry* from the

22nd to the end. Barometer 29·964 in. on the 26th, and 30·277 in. on the 28th (at Kew). Mean temperature 11° *above* the average on the 26th and 29th insts.

6TH PERIOD.—Solar *conjunction* with Neptune March 26th, 1863. The barometer (at Kew) was above 30 inches from the 23rd to the 27th inst. (inclusive), notwithstanding the depressing influence of Saturn on the 25th inst. The mean temperature was *above* the average from the 23rd to the end, being 11° in excess on the 24th and 25th insts., and 8°·7 in excess on the 26th. There was *no rain* from the 22nd to the 29th inst. Wind brisk. The struggle for supremacy was interesting to watch, on the 25th inst. especially, when the influence of *equal declination* of the Sun and Saturn contended with the evaporative influence of Neptune—hence there was fog in the metropolis.

7TH PERIOD.—The Sun again joined Neptune on the 25th March (Good Friday), 1864. This was a lovely day. There was fog in the early morning in the metropolis—the Sun being 30° from Venus on the 24th, and in *equal declination* with Mercury on the 26th. No rain fell on the 24th and 25th, and but a small quantity on the night of the 26th inst. The barometer was low on the 26th under Mercury's influence.

Many careful observations will have to be made before astro-meteorologists will be able to feel warranted in predicting dry and warm weather when Neptune is in aspectal positions, any such predictions at present must be to some extent speculative.

In a letter to the *Northampton Mercury* (June 4th, 1864), the author wrote the following prediction :—

"There will be a conjunction of Mars and Neptune on the 7th inst. Therefore, I look for fair, warm, but windy weather from the 6th to the 9th."

That this prediction was fulfilled is proved by the Registrar-General's report of the weather in the week ending June 11th, 1864 :—

"At the Royal Observatory, Greenwich, the mean height of the barometer in the week was 29·744 inches. The reading rose to 29·86 inches on Monday, and fell to 29·60 inches on Thursday.

The mean temperature of the air in the week was 59·6 deg., which is 2·1 deg. *above* the average of the same week in 43 years. The mean temperature was above the average on five days. The lowest night temperature was 45·5 deg. on Sunday. The highest day temperature was 78·4 deg., on Tuesday [the 7th inst.]. The range of temperature in the week was, therefore, 32·9 deg. The mean daily range was 24·1 deg. . . . . The wind was in the south-west. There was no rain."—*Times*, June 16th, 1864.

Compare the above with the report of the weather of the previous week (*vide* p. 70) when the mean temperature was 5·9 deg. *below* the average of 43 years, and a rain-fall of 0·78 in. was recorded; and the influence of Neptune is shewn to be opposite in character to that of Saturn—viz. evaporative and calorific.

CHAPTER XI.

ON THE CAUSE AND FALL OF RAIN.

THE amount of rain-fall is of such immense importance to agriculturists and others, that we think it well to offer a few remarks on the probable cause of rain, and on the possibility of anticipating periods when a fall of rain shall take place. Capt. Morrison, R.N., who has been a diligent student of meteorology for more than thirty years, has kindly sent us (at our request) the following paper

On the Cause of Rain.

"Nothing in meteorology has more puzzled the writers thereon "than the cause of Rain. We have had an abundant crop of "theories thereupon; but they are now mostly forgotten, yet "the real cause of this phenomenon seems very simple and very "easy to understand. It depends chiefly on the changes of tempe- "rature in the gases of the atmosphere. Thus, when drought "exists in any given place, it produces evaporation; and this goes "on more or less rapidly, according as there is more or less "moisture to be evaporated. But we are not to expect always "that when evaporation has gone on for a length of time in any "locality, that rain will ensue there. It may be that the vapours "are carried away by the wind, floating in the air (either "condensed into visible cloud, or not), and may not be sufficiently "condensed to fall to the earth again, until they are removed "entirely away from that locality. So that the rain we see may "have had its origin in the far distant waves of the ocean, either "to the south, or south-west. In this case they fall generally "over the land in Ireland, and fail wholly, or in part, to reach "England at all. Hence, we see that in the western portions of "England the fall of rain is much more extensive than in the "eastern portions. And, in fact, the eastern coast has scarcely "one half the rain-fall noted on the western coast. For the same

"reason, we find the clouds, pregnant with rain, are attracted by "the mountains; hence mountain regions are more subject to "pluvial influence than are the plains and lower lands.

"When the air is dry and cold, evaporation goes on; and, but "little rain follows. So that it frequently happens that we have "a long east wind, or easterly wind, with everything dried up; "then follows suddenly *an increase of heat*, with a westerly wind, "and there comes over us a body of air, surcharged with "moisture even to the degree of condensation into cloud, which "at length bursts in a deluge of rain. Now the only question is, "'What causes the change of temperature that precedes rain'? "'Why does not the easterly wind, when it once fairly sets in, "continue to blow, or why does the westerly wind suddenly over-"power the dry easterly wind?' To answer these we must "consider that the dry wind, being free from aqueous vapour, is "the heavier body of the two; and that it will, of course, be "nearer to the Earth; while the westerly current will rise over "it, as being the lighter. But the condensation goes forward "and the moist air mixes with the dry air gradually, and more or "less rapidly, until the westerly current prevails, and the rain "falls. It rarely happens that rain occurs with an easterly current "of air, though it may do so, after a long easterly wind, when "the air is saturated with moisture; which collects in the upper "portions until evaporation ceases, condensation begins, and rain "ensues. The cause of change of temperature taking place "suddenly is certainly not the motion of the Sun. For that moves "gradually from north to south, or the reverse. And as it is "always found in the same place, on the same day of the year; "it follows that, if the temperature depended thereon, we should "always have the same temperature on the same day of the year. "This is very far from being the case. It is obvious, therefore, "that some other cause than the Sun prevails. This can only be "generally the place of the Earth among the other planets. And, "beyond doubt, we find the temperature increase when the Earth "is so placed as to bring Mars or Jupiter in a line with the Sun, "or with each other. And, in the same way, we find the tempe-

"rature decrease when Uranus or Saturn is so placed. There are "other positions, which operate in a similar manner; but it is "not necessary to enter at large into their description. Now, "it may be objected, that such positions of the planets ought "to operate in all parts of the world alike. But we do not "yet know *how* they operate; though most likely by means of "electricity. And when it can be shewn that all parts of the "world are alike, and that no difference of soil, or peculiar locality, "affect the question, by increasing or diminishing the electricity, "it will be time enough to consider the objection. In the mean "time we would draw attention to the fact, that there are few "great cosmical operations into which the Moon does not enter; "and her swift motion renders her influence very variable, and "helps to complex the question. It may, therefore, be taken as "a fact that the increase or diminution of aqueous vapour which "immediately precedes rain, very generally depends on the change "of temperature in the air; and that such change of temperature "is effected by planetary action. And this is the reason why, "when Venus is in aspect to the Sun, or to Mars, we find a fall "of rain at hand; for Venus seems to be chiefly of a pluvial "character. And it is a pity that this great and undeniable *fact* "has not yet been thought worthy of examination by our *savans*. "But their neglect of the fact will never alter its nature."

The total amount of rain-fall which occurred under Saturn's influence* (registered at the Kew Observatory) in 1863 was 6·067 inches. That under Venus' influence was 2·669 inches. Under Uranus' influence 4·409 inches. Under Mercury's influence 4·802 inches. These amounts added together, form a total of 15·278 in.—the total amount of the year being 19·954

* *Id est*, when Saturn was on the Equator (the rain-fall of five days—two days before, and two after the day of position) and when the Sun formed *aspects* with that planet (in these cases the rain-fall of the day preceding the day of the *aspect* and the one succeeding it is taken).

inches—leaving 4·676 in. to be accounted for by the "mutual" aspects of the wet planets.

January was a very wet and stormy month. When the rain-fall of that month is contrasted with the corresponding one of 1862 and 1864, the effect of *Saturn on the Equator* is at once seen.

	Rain Inches.	Barometer Inches.
1862, January . .	1·637 . . .	29.840
1863, January . .	2·488 . . .	29.765
1864, January . .	0·957 . . .	30.184

The rain-fall of January, 1863, was *one inch in excess* of the average.

The importance of this difference to the farmer (the rain-fall of Jan. 1863 being almost equal to that of Jan. 1862, and Jan. 1864 combined) may be imagined when it is remembered that the amount of water received by the soil is, in round numbers, 100 tons *per acre* for every inch of rain-fall. "226,225·52 lbs., 22,622·55 gallons per acre. Or 144,784,333 lbs., 14,478,433·3 gallons, or 64,635·86 tons *per inch, per square mile*"—according to Sir John Herschel.

"According to a guage kept at South Parade, Penzance, "Cornwall, 94 feet above low-water level, the greatest fall of "rain in 1863 was in January, June, and December. The 11th "and 12th of June, and the 3rd and 4th of December were most "remarkable for heavy rain-falls."—(*Times*, Jan. 1864).

"The Yorkshire rain-fall.—The greatest rain-fall in any "24 hours of the five years" (1859, '60, '61, '62, and '63) "was "on the 31st of August, 1863 = 1·48 inches."—(*Times*, Jan. 14, 1864).

The heavy rain-fall of the 31st August, 1863, was due to Saturn crossing the Equator on September 2nd,—so that in 1863 we had three distinct proofs of the pluvial influence of Saturn, viz., the crossing of the Equator on January 1st and 16th, and Sept. 2nd—in each instance heavy rain and gales occurred.

The heavy rain-falls of June 11-12th were due to the Solar *conjunction* of Uranus on the 12th, and of Mercury on the 13th—

being assisted by the *equal declination* of Venus and Mars on the 11th inst.: and the *sextile* aspect (60°) of Saturn and Mars on the 13th.

The remarkably heavy rain-falls of December 3-4th, 1863, occurred shortly after the solar *conjunction* of Mercury (Dec. 1st, $11^h\ 38^m$ P.M.); the effect being enhanced by the *trine* aspect (120°) of Venus to Uranus on the 2nd inst.; and Mercury in *equal declination* with Uranus on the 4th inst., and 60° from Saturn on the 5th inst.

June, 1863, was a very wet month, "London having nearly "double the average amount. July was one of the driest on "record, the deficiency prevailing almost equally in all parts of "the kingdom." (Mr. G. J. Symons' letter in the *Times*). In the former month (June) the Sun and Earth formed the angle of 90° (the *square* aspect) with Saturn—on the 20th; and in the latter month (July) the same aspect was formed with Jupiter—on the 11th. In JUNE Saturn was stationary on the 2nd inst., Venus passed Mars on the 3rd inst., the Sun was in equal declination with Mercury on the 4th, and with Venus on the 8th—Venus being 60° from Saturn*. Then Venus in eq. dec. with Mars on

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* LARGE FALL OF RAIN. To the Editor of the *Times*. Sir,—The dry season has at last been followed here by an unusually continuous fall of rain, no less than 1·235 inches having fallen between 8 A.M. on June 5 and 8 A.M. to-day, 24 hours. As the fall of rain at different places during the last five months is of particular importance in an agricultural point of view, as well as in a meteorological one, I beg to send you the following results of observations at this place:—

	Rain-fall in 1863.	Average fall of last 10 years.
January	4·087	2·505
February	0·809	1.360
March	0·832	2·262
April	1·894	2·109
May	2·252	2·628
	9·874	10·864

I remain, Sir, your obedient servant,

Clifton, June 6th, 1863. WILLIAM C. BURDER.

11th, Sun conjunction Uranus on 12th, Sun conjunction Mercury, and eq. dec. Uranus on 13th inst. Consequently, *rain fell on every day from the 5th to the 20th* (with one exception). In JULY, the Sun 90° from Jupiter on the 11th inst., (Neptune *stationary* on the 12th) and Mars 60° from Jupiter on the 16th—there *was no rain from the 1st to the 21st* (excepting ·001 registered on 19th).

Wettest days of 1863 (*at Kew Observatory*).

	Rain. Inches.	ASPECTS.
January 13th . .	·622 .	☿ 120° ♄
February 19th . .	·142 .	♀ □ ♅. ☽ ☌ ♀
March 8th . . .	·224 .	☉ □ ♅. ♄ ☌ ♆
April 9th . . .	·083 .	☉ ✶ ♅ et ♂. ♂ ☌ ♅
May 19th . . .	·323 .	☉ 120° ♄, 45° ♂.
June 19th . . .	1·246 .	☉ □ ♄. ☽ ☌ ♂
July 22nd . . .	·403 .	♂ ✶ ♅
August 27th . .	·525 .	☿ □ ♅. Saturn on Equator.
September 20th .	·597 .	☉ eq. dec. ♄. ☿ eq. dec. ♀
October 31st. . .	·469 .	☽ ☌ ♅. ☉ ☌ ♃
November 2nd . .	·777 .	☉ 135° ♅.
December 3rd . .	·675 .	♀ 120° ♅. ☿ eq. dec. ♅.

Jupiter was *stationary* on the 11th of February, 1863, and the Sun formed the angle of 120° with that planet on the 16th inst. *No rain was registered* at Kew Observatory on the 9th, 10th, 11th, 12th, 13th, 14th, 16th, 17th, and 18th—and only ·009 in. on the 15th.

Jupiter was again *stationary* on the 13th of March, 1864, and the Sun was 120° from Jupiter on the 17th. *No rain was registered* at the Kew Observatory on the 14th, 17th, 18th, 19th, 20th, 21st, and 22nd,—but ·003 in. on the 13th, ·020 in. on 15th, ·050 in. on 16th. (*Eleven* of the first twelve days of March were wet, 2·078 inches of rain being registered in those 11 days).

We have in our possession a few tables of meteorological observations made at Althorp (the seat of Earl Spencer, Northamptonshire); from them we ascertain that the conjunction of the Sun

and Jupiter on January 30th, 1855, was attended by *dry weather from the 22nd inst. to the end of February.* And the conjunction of these bodies on March 5th, 1856, was again attended by *dry weather from the 13th of February to the 15th of March.* Again, the conjunction of August 31st, 1861, was marked by *absence of rain from the 22nd instant to the 7th of September following**.

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* THE RAIN-FALL OF 1862.

To the Editor of the Northampton Mercury.

Sir,—The fall of rain during the past year (as registered at Althorp) having been so much in excess (4·76 inches) of the previous one, I beg to offer some remarks on the wettest periods of 1862, the importance of which to your agricultural readers I must plead in asking for the space in your valuable columns which your liberality may allot me. The wettest days of the year (1862) were:—

Jan. 24th (0·40 in.), Venus 90°, and Mercury 120° from Uranus. Feb. 17th (0·13 in.), Mercury and Uranus *stationary;* Venus 90° from the latter planet. March 23rd (0·67 in.) Mars eq. dec. Uranus. April 9th, (0·38 in.), the Sun in eq. dec. Saturn. May 6th (0·95 in.), the Sun in *conjunction* and eq. dec. with Mercury, 120° from Saturn. June 12th (0·95 in.), Sun in eq. dec. with Mercury. July 5th (0·60 in.), Sun in eq. dec. with Uranus, Saturn 90° from Uranus. August 17th (0·61 in.), Mercury 60° from Uranus. September 9th (0·55 in.), Venus 60° from Uranus. October 11th (0·40 in.), Venus on the *Equator.* Nov. 29th, (0·17 in.), Venus 60° from Saturn. Dec. 9th (0·28 in.), Sun eq. dec. and *conjunction* with Venus, and in *opposition* to (180° distant) Uranus.

To summarize the other days on which rain fell, I find that on 17 occasions the Sun was in aspect to Uranus; 17 to Saturn; 11 to Venus; and 10 to Mercury. Venus in aspect to Saturn on 9 occasions; to Uranus 8. Mercury in aspect to Saturn on 9 occasions; to Uranus 8.

During the whole of May, June, and July, and the first three weeks of August, Saturn was within 92° of Uranus; the aspect (90°) being completed on the 18th of July; and, accordingly, May, June, and July were *very wet* months, 7·72 inches of rain falling in those months, and 1·61 inches on the first 17 days of August (no rain falling after the 17th).

Saturn was 90° from Uranus in December, 1860, and in January, 1861, there was then a good deal of rain—especially on the 1st of January—and three weeks frost in January.

On April 6th, 1861, the Sun was 120° from Jupiter, and that planet was *stationary* on the 13th inst. *No rain was registered at Althorp from the 3rd to the 27th inst.*, the rain-fall of the month was but slightly over *half an inch.*

The 13th of November, 1861, was the *wettest* day of the month and *year* (1·20 in.); a gale raged on this day and the preceding one; the Sun in *conjunction* with Mercury, in *sextile* aspect (60°) to Saturn; sharp frost at night. The 14th was fairer and milder, when the Sun completed the sextile aspect of Jupiter; *no rain fell till the 22nd inst.*

The conjunction of Saturn and Jupiter, October 21st, 1861 ($2^h\ 8^m\ 17^s$ P.M.), rendered that month an important one to *Astro*-Meteorologists. This conjunction occurs but once in about twenty years. It has, therefore, been called "*the great conjunction.*" The next will take place in 1881 (in the sign *Taurus*). At Northampton the 21st of October, 1861, was ushered in with bright and lovely weather, but shortly after the *conjunction* took place, the sky became clouded (cumulo-strati), and in the evening there was a slight fall of rain (0·05 in.)—the *maximum* temperature was 58°, and the *minimum* 50°. On the 22nd there were dashing, heavy showers. For several days before and after the *conjunction* the atmosphere was greatly disturbed by strong (easterly) winds. The 24th was the *wettest* day of the month (0·26 in.).

The third week of January, 1862, the second week of March, third in April, May, and June, the last week of August, the third in September, the first in October, the second week in November, and the last fortnight of December, incontestably prove, by their freedom from rain, the reality of the evaporative influence of the aspects of Jupiter and Mars. Fear of trespassing on your space will not allow of my entering on them in detail. Trusting that the above facts will induce many persons to fairly observe the configurations of the heavenly bodies in connection with atmospheric phenomena, and that much benefit will accrue therefrom.

I have the honor to be, Sir,

Yours obediently,

London, Jan. 19th, 1863. ALFRED PEARCE.

Mr. White in his "Meteorological Summary of the year 1861," said of October, "this month was remarkable for very dense "fogs and heavy gales at sea. There was a great preponder- "ance of easterly winds, yet the temperature was not low."

Thus was verified the prediction in the *Record* of the Astro-Meteorological Society (No. IV, Oct. 1st, 1861):—"The con- "junction of Saturn and Jupiter on the 21st is an aspect "which takes place only once in about twenty years. It will "greatly derange the atmosphere for some days, and cause a "boisterous rainy period."

It will be apparent to all our readers from the facts and observations contained in this chapter, and in those on the several planets, that when Uranus, Saturn, Venus, and Mercury are in the 'positions' or 'aspects' before described, in regard to the Sun, the Moon, and the Earth, and when in 'mutual' aspect also, *rainy* weather prevails. On the other hand, when Jupiter, Mars, and, probably, Neptune, are in similar positions, *dry* weather prevails.

It has been asserted that Mercury brings more rain when *retrograde* than when direct in the heavens. This requires confirmation.

We think it probable that the influence of the planets is modified when they pass through the several signs of the Zodiac, in a similar manner to that in which the Sun's influence varies according to the *sign* he occupies, as observed by Ptolemy, and mentioned at pp. 32-3. For instance, there is an axiom founded on numerous observations, that "earthquakes generally happen when there are several planets in *Scorpio* and *Taurus*."

The conjunction of the Sun and Jupiter in *Scorpio*, on October 31st, 1863, brought a violent gale, thunder and lightning; and the conjunction of Mars and Jupiter on Nov. 21st, 1863 (in *Scorpio*) was marked by a storm of wind and rain. Ptolemy says, "Scorpio, in its general character, is fiery and productive of thunder."

The aspects of Venus to Mars frequently produce fog, or "Scotch mist."

CHAPTER XII.

STORMS.

Hæc ubi dicta, cavum conversâ cuspide montem
Impulit indatus; ac venti, velut agmine facto
Quà data porta, ruunt, et terras turbine perflant.
Incubuere mari, totumque a sedibus imis
Una Eunusque Notusque ruunt, creberque procellis
Africus, et vastos volvunt ad littora fluctus.
Insequitur clamorque virûm, stridorque rudentum.
Eripiunt subitò nubes cœlumque, diemque
Teucrorum ex oculis; ponto nox incubat atra.
Intonuere poli, et crebris micat ignibus æther;
Præsentemque viris intentant omnia mortem.
* * * * * * *
Adparent rari nantes in gurgite vasto;
Arma virûm, tabulæque, et Troïa gaza per undas.

Virgil, Æneid I.

STORMS—in whatever form they visit us are always destructive to life and property, and are therefore of paramount importance in meteorological studies. And it should be the first endeavour of meteorologists to anticipate as accurately as human skill directed to the observations of these phenomena will admit, the periods when they shall occur.

Admiral Fitz Roy has studied this question for some years, and he is now very successful in 'forecasting' storms a few hours in advance, when the variations of the barometer and thermometer indicate that atmospherical disturbance is imminent. But on the approach of a *northerly* gale the mercury does not fall. In such a case no 'warning' from the Meteorologic Office can be transmitted to the coasts in time to avert the destruction of vessels which may be put to sea in ignorance of the impending danger.

Again, a period of 24, 48, or 72 hours' warning is insufficient in many cases. And the 'forecasts' cannot reach the captains

of vessels out at sea. Yet they are very useful to coasting vessels, and to the poor fishermen.

It is here that the superiority of *Astro*-Meteorology is apparent. For if it can be shewn that when the Earth forms certain angles with the Sun and planets, gales of wind or storms invariably occur, it becomes easy to anticipate periods of atmospherical disturbance, by calculating when such angles or 'aspects' will be formed by those planets.

Mr. Saxby made the following prediction in a letter to the *Standard*, Oct. 9th, 1863:—

"Now let any man tell me what other influence can be "adduced *to coincide for that period* (December 10th to 13th) so "as to increase the *chance* of the *most destructive storm* and *the* "*most dangerous tide* with which this Earth without miracle can "be visited."

The following letter appeared in the *Standard* of Oct. 14th, 1863:—

To the Editor. Sir,—Will you kindly allow me to make a few remarks in your valuable journal on two paragraphs of Mr. Saxby's letter which appeared in your impression of yesterday? . . . . Mr. Saxby says, "such, then, being my object (and not to vindicate any favourite views)," &c.; and speaking of the expected dangerous period of Dec. 10th to 13th next [Let any man, &c. as quoted above]. . . . . As to the storm-period of Dec. 10th to 13th, let Mr. Saxby observe, that on the 10th the Earth will pass between Mercury and Uranus, and on the 15th between the Sun and Uranus. These positions have for years been observed to produce heavy gales. I do not oppose the lunar theory. I have faith in it, but I believe that the Moon acts but in a secondary manner. For instance, on April 27th last, Mars was in his extreme northern declination, and 90° from Saturn; a heavy gale raged on that day; the Moon not being in any of the positions named by Mr. Saxby, but crossed the Equator two days *afterwards*. I will not presume to ask for more space to cite other instances, but must apologize for trespassing so much, and beg to subscribe myself,

Your obedient servant,

London, Oct. 10th, 1863. ALFRED PEARCE.

Mr. Saxby quoted records of gales occurring at Haverford west, Pembroke; at Boston Spa, near Tadcaster; at the Shetland Isles; at Bath, Bristol, Nairn, Cape Clear, and Liverpool as instances of the fulfilment of his prediction.

Mr. Saxby quoted also the letter of the Melbourne correspondent of the *Times*, which appeared in that journal of 13th February, 1864, to the effect that "on Monday the 14th inst. (December) the weather, which had been for some days previously somewhat unsettled, culminated in one of the fiercest and most prolonged gales of wind, at irregular intervals rising to the strength of a hurricane, ever known along the Australian coast. Accompanying the wind was such a deluge of rain that speedily several of our lower streets seemed converted into rivers," &c.

Mr. Saxby attributes all this disturbance to *lunar* influence alone. The gales commenced on the 10th inst. when the Earth was in a line with Mercury and Uranus; and the hurricane at Melbourne commenced on the 14th inst. (*two days after* the Moon was in perigee, and *four days after* the new Moon and 'stitial colure'), a few hours before the Earth came in a direct line with the Sun and Uranus (Neptune being *stationary*), so that these influences "coincided" with the Moon's positions, in the first instance, and so "increased the chance" of a heavy gale raging at that period.

A heavy gale raged on Dec. 6th, 1861, when the Earth was in a direct line with the Sun and Uranus, the *Moon being in no extreme position*—having crossed the Equator *three days before.*

Again, Philadelphia was inundated on the 13th of September, 1862. "Lives were lost. Property was destroyed to the extent of more than a million of dollars. Water was five deep in some of the principal streets" (Manhattan's letter in *Standard* of Sept. 30th, 1862). *On this day the Sun was* 90° *from Uranus*, and in equal declination with Saturn and Mercury; *the Moon was not in any extreme position.*

The storm of Dec. 1st, 2nd, and 3rd, 1863 (due to the Solar conjunction with Mercury) was far more destructive than that

of the 10-11-12th; yet *the Moon was in no extreme position*, but crossed the Equator on the 4th.

Therefore we are justified in saying that *the Moon when acting alone does not bring "most destructive storms."* But when she arrives at one of her extreme positions *at or near the time* of 'stormy aspects' being formed between the Sun, Earth, and planets, she *hastens, delays, or enhances the effect.* As, for instance, in the great storm of Oct. 30-31st, 1863; the Moon arrived at her extreme N. declination ('stitial colure') on the 30th, thereby hastening the effect of the Solar conjunction with Jupiter on the 31st.

If the *lunar* positions of January, 1863, caused the violent gales which raged in that month, why did not the lunar positions of January, 1864 (which were really more important than those of the preceding January) bring similar disturbances? The gales of January, 1864, were trifling compared to the frequency and force of those of January, 1863.

The mean hourly movement of the wind, in miles, as recorded by Robinson's Anemometer, at the Kew Observatory, was

	Miles.
In Jan. 1863 .	16·8 (or 399½ miles per diem).
„ Jan. 1862 .	11·5
„ Jan. 1864 .	9·9

The excess of the mean velocity of wind in Jan. 1863, over Jan. 1862, being 5·3; and the excess over Jan. 1864, 6·9. Indeed, the nearest approach to the mean velocity of the wind of Jan. 1863, in the years 1862-3-4, was that of March, 1864 = 13·7, which is 3·1 *less* than that of January, 1863. So that January, 1863, was the *most stormy of* 27 *consecutive months*—from the commencement of 1862 to the end of March, 1864.

The *true* cause of the extraordinary disturbance of Jan. 1863, was that, Saturn was *within two minutes of arc in declination during the first three weeks of that month*—crossing the Earth's Equator on the 1st inst.; and becoming *stationary*, and re-crossing the Equator on the 16th inst.

The *greatest* disturbances of our atmosphere occur when Saturn, Uranus, or Mercury crosses the Earth's Equator, or forms a *major* aspect (*conjunction*, *opposition*, equal declination, and 60°, 90°, and 120° difference of longitude) with the Sun; and when two of the superior planets (Uranus, Saturn, Jupiter, and Mars) form a 'mutual' *major* aspect, one of them being in major aspect to Mercury.

Much disturbance often takes place when the *minor* aspects are formed between any of the planets above named, and with the Sun, coincident with the Moon passing one of the bodies in aspect, or being at the time near the Equator (lunar equinox), or in extreme declination (stitial colure)—especially if the new or full Moon occur at the same period—and the effect may be hastened or delayed, according to whether the lunar position falls before or after the planetary aspect is formed.

The Solar and mutual aspects of Jupiter and Mars (especially when one of them is in aspect to Mercury) almost invariably produce thunder-storms in summer and autumn, frequently accompanied by hail. For instance, "the thunder-storm of "Sept. 3, 1841," which "visited at the same time London, Paris, "Rouen, Magney, Lille, and Evereux" (Sir J. Herschel's *Meteorology*, p. 136), was due to the *Sun* 90° *from Jupiter on that day.*

The storm of August 23-4, 1855, was terrific, "the blaze of lightning was almost uninterrupted for many hours, from a series of clouds passing from west to east, in two lines, over the south of England." *Mercury in equal declination with Jupiter.*

Sir John Herschel remarks on these storms—and on the commencement of the S.W. monsoon in India, in May, 1848 (*Mars in conjunction with Jupiter*), being marked "by a thunder-storm extending over 600 miles from N. to S., and measuring 50 miles in breadth"—that "the mere evaporation of water would seem "at first sight inadequate for the supply of so vast an expen- "diture, were it not that we learn from Dr. Faraday that the "chemical action of a 'grain of water on four grains of zinc can "evolve a quantity of electricity equal to that of a powerful "flash of lightning!"

Sir John Herschel also says, "when it" (lightning) "strikes "into deep sand, it produces those extraordinary hollow tubes "*of fused quartz!* known as 'fulgurites,' of which the British "Museum possesses a magnificent specimen, dug out near Dres- "den by Prof. Fiedler. Other effects of lightning are recorded "in the Athenæum, No. 1535, March 28, 1857, too marvellous to "be recounted here, but which, should they be verified, would "open quite a new field of inquiry in electrical research."

The hurricane of May 6-7, 1862 (Sun in conjunction with Mercury, and 120° from Saturn on 6th, *and Mercury* 120° *from Jupiter on 7th*) was remarkable, being accompanied by a violent thunder-storm. Mr. Lowe's description of it, in the *Intellectual Observer*, July, 1862, was as follows:—

"Near Peterborough, the direction of the storm was from S. to "N.E.; here, for one and a half miles in width, the crops were "devastated by huge hailstones of three inches long, two inches "wide, and half an inch thick, and much glass was broken. . . . . "At Whittlesea the hailstones were from four to five inches in "circumference. At Buxton, the storm commenced between four "and five o'clock, and by 5h. 45m. P.M., the darkness was too great "to allow of reading or working, and gas was lighted; there was "heavy rain, but no hail. The lightning was first *blue*, then *peach*, "*mauve*, or *rosy blue*. At Whaley Bridge there was a deluge of "rain with sudden fierce S.W. gusts. At Wisbech, at 6h. 15m. "P.M., the darkness was so great as to render it almost impossible "to see close to a window; wind S.W. . . . . At Whittington "(three miles from Chesterfield) hail commenced at a quarter to "five o'clock with W. wind; some stones were four inches round, "and one and a quarter inches in diameter, weighing from a quarter "to half an ounce, and breaking much glass. . . . . At Leeds the "hailstones were seven inches in circumference." [This was on the 7th inst.]

"On the previous evening, it is worthy of remark, that a violent "thunderstorm was raging in the Isle of Wight, extending all the "way to London. Also at Clitheroe, Tunbridge, Hurst-Pierpoint, "Byfleet, Aldershott, Nottingham, Derbyshire, Leicestershire, "Yorkshire, and Lincolnshire, accompanied with large hailstones "and *rose* coloured lightning. At Highfield House there was

"continuous thunder all the afternoon in S. and S.E., from storms "following each other in rapid succession in a S.W. current; at "4 P.M. the wind, which had been N., veered to W., and at ten "minutes to eight a thunder-storm in a S.S.E. current, commenced "passing over, the lightning exceedingly vivid and very blue in "colour. At eight o'clock, for two minutes, there was a hailstorm "with stones of a conical form, and as large as nuts. Above an "inch of rain fell. . . . . And this leads us to the memorable 7th "of May, a day that will long be remembered in Nottinghamshire, "memorable for the hurricane near Newark, and for the violence "of the thunderstorm in the neighbourhood and elsewhere, parti- "cularly striking from the *night-like* darkness, the great size and "curious forms of the hailstones, and on account of the magnificence "of the colour of the lightning. . . . . The sky gradually became "blacker and blacker" [at 4h. 30m. P.M.] "until, at five o'clock, it "was darker than I had ever before seen it in the day-time, with "the solitary exception of the total eclipse of the Sun in July "1860, within the central path in Spain. A book could be scarcely "read at a window, nor away from it could the time be ascertained "by a watch. . . . . Rain fell in torrents, being swept along the "ground in clouds like smoke. The colour of the lightning was "lovely beyond description, an intense tint of *bluish-red*, approach- "ing *rose*, all the flashes being of the same hue. The lightning "was too brilliant to look at without pain to the eyes, but when "reflected on white paper, the colour was most beautiful, and, "indeed, surpassed all known colours, as much as ultra-marine "surpasses ordinary blue. . . . . Severe as this storm was at "Highfield House, it dwindles into insignificance when compared "with its violence near Newark, where it was accompanied by a "hurricane and hailstorm similar to those occasionally witnessed "in India. . . . . A gardener who was out in the storm, says "that he observed it hurling down trees to the south of him passing "by, and then throwing them down in the north; and that from "where he stood, he considered that in two minutes everything was "destroyed within his view, which extended a mile and a half. . . . "The fall of 22°·6 of temperature in two hours at the Highfield "House Observatory (twenty miles away) was no doubt owing to "this gale." Through some windows the force of the gale drove the hailstones *like bullets shot from a rifle*—circular pieces of glass being punched out.

We may remind Mr. Saxby that *the Moon did not cross the Equator until the 9th inst.;* therefore his "weather-theory" *cannot account for this hurricane.* If any proof be needed that the aspects of the Sun, Mercury, and Saturn produced this hurricane, we may mention the "terrific gale" of Jan. 11th, 1862, when *the same aspects were formed* (Sun in *conjunction* with Mercury, and 120° from Saturn on the 12th), recorded in Hannay's Almanac (1864) in the following words:—

"Jan. 11th. The mail steamboat 'Courier' from Southampton to the Channel Islands, encounters a terrific gale, and is so tempest tossed, that many of her passengers suffered injury in consequence."

The Moon did not arrive at her extreme N. declination till the 13th.

Now this "terrific gale" of Jan. 11th, 1862, was predicted in the *Record* of the Astro-Meteorological Society (Jan. 1st, 1862) in these words; "11th a disturbance, and an unsettled state of the atmosphere. On the 12th we find the Sun joined with Mercury, and both these bodies forming a trine aspect with Saturn. This will bring a *very stormy season;* and we may fully expect a heavy fall of rain and much wind, very destructive to the shipping; especially on the *south* and *western* coasts, because the temperature is not likely to be low, in consequence of the stationary position of Jupiter at the time."

Moreover the President of the A. M. Society predicted in the *Record* further gales for the 25th Jan. 1862, in the following words, "But on the 23rd and 24th we have the Sun, Venus, Mars, and Mercury all in aspect, and the Moon falling on to the declination of four planets; whence as Mars also forms an opposition of Uranus on the 25th, I judge that this also will be one of the great storm periods of the winter." Hannay's Almanac records the fulfilment:—

"25th. Fearful gales prevail during two days near Milford Haven, during which three vessels go down with all on board."

Again, *the Moon did not reach her 'stitial colure' till the 26th,* whereas the gales commenced on the 24th, which day was very wet.

If any doubt that the opposition of Mars and Uranus, &c. produced these gales, we may refer to the gale of the 16-17th Jan. 1864*, when the next opposition of these planets occurred. And we might also refer to similar weather occurring when Mars opposed Uranus (i.e. the Earth passing between those planets) on Feb. 6th, 1860, and on August 19th, 1856.

We extract from Hannay's Almanac (1864) *all the records of remarkable weather in all parts of the globe*, in 1862.

N.B. For explanation of the symbols, see page 13.

DATE.	WEATHER.	PLANETARY POSITIONS.
Jan. 5th.	A fall of rain occurs at Rio de Janeiro to an extent never before known .	2nd Saturn stat. „ ☿ ext. declin. 3rd ☉ 150° ♓ 4th ☉45°♂, ☽☌♀ 7th ☉ 45° ♀
„ 11th.	A terrific gale in the Channel . .	12th ☉ ☌ ☿ et 120° ♄
„ 15th.	On this and the previous day various thermometers in the shade at Melbourne mark from 105° to 111°.	15th ☉ eq. dec. ♂ „ ☿ 120° ♃
„ 16th.	The 'Crisis,' of Liverpool, 1,000 tons, goes down off the coast of Wicklow during a severe gale; the Captain and 20 persons lost.	
„ 17th.	The schooner 'Bellona' wrecked in Dundrum Bay, and three lives lost	17th ☉ 120° ♃
„ 18th.	The severe frost causes the chains of the steam crane to snap, while being used in raising a 10-inch gun, weighing 95 cwt., from one part of the Chatham dockyard to another . . .	18th ☉ 135° ♓

* According to Admiral Fitz Roy's 'Meteorological Table' of Jan. 16th, a gale was raging (at 8h A.M.) at Penzance and at Plymouth. And by the next table (Monday, Jan. 18th) a hurricane of wind had been raging 'since last report' at Galway and at Cape Clear (estimated force 12). And "during a heavy gale from the south, the Alfred, of Gloucester or Bridgewater, was lost, with all hands; the Hamburgh was also lost," on the 17th; and on the 16th, "the Clara got on the Goodwin Sands during heavy weather, and has become a total wreck."—*(Evening Standard*, Jan. 18th, 1864). This was three days after the Moon crossed the Equator.

DATE.	WEATHER.	PLANETARY POSITIONS.
Jan. 24th.	San Francisco inundated . .	24th ☿ □ ♓
„ 25th.	Fearful gales, for two days, at Milford Haven	„ ☿ 120° ♓ et 25th ♂ ☌ ♓ [60° ♂
Feb. 4th.	News received from California states that during the disastrous floods, 1,000 Chinamen were washed off the Long Bar, and vicinity, on the Yula, and drowned	1st ☉ 120° ♓ 4th ☉ 144° ♄ „ ☉ 30° ♀
„ 5th.	The communication between Vienna and Paris is interrupted by a series of floods, which also cause great damage and suffering throughout all the Austrian Provinces	5th Venus stat. 7th ♂ □ ♄ 9th Venus on the Equator
„ 16th.	Lisbon visited by a terrific thunderstorm. A lighter in the harbour is struck by lightning, and sinking, her crew perish	17th ☉ 60° ♂ „ ☿ stationary
Mar. 2nd.	The north of England is visited by a severe snow-storm	2nd ☿ ☌ ♀ 3rd ☉ eq. dec. ☿ „ ☉ □ ♓
„ 10th.	The American ship 'Ocean Monarch' is abandoned at sea in a leaky state .	10th ☉ ☌ ♄, „ ☉ eq. dec. ♃
„ 13th.	Paris is visited by a hailstorm, followed by heavy thunder and lightning .	12th ☿ stationary 13th ☉ ☌ ♃ „ ♀ eq. dec. ♃
„ 21st.	A fall of snow heavier than any known for years occurs in Wilts and Somerset.	20th ☉ 30° ♀ 21st ☉ 72° ♓
April 3rd.	Calcutta visited by a severe hailstorm, some of the hailstones measure nearly two inches in diameter . .	3rd ☉ 60° ♓ „ ☉ eq. dec. ♃ „ ☿ ☌ et eq. dec. ♄
„ 7th.	Auckland visited by a terrific storm, which destroys shipping in the harbour to the value of £10,000 . . .	5th ☉ eq. dec. ☿ „ ☿ ☌ ♃ 7th ☉ 150° ♄ 8th ☉ eq. dec. ♄
„ 14th.	Marseilles visited by a hurricane of such violence that pedestrians are thrown down, and all the ships outside the port driven out to sea. The Cunard steamship 'Karnak' is wrecked while entering the harbour of Nassau.	13th ☉ 144° ♄ 15th ☉ 144° ♃ „ ♀ eq. dec. ♃ „ Mercury on Equator
„ 17th.	[A shock of earthquake is felt at Chatillon sur-Saone]. The ship 'Lady Denison' in lat. 38 min. 30 sec., and long. 149 min. 50 sec. E. encounters and escapes the peril of 9 waterspouts in 20 minutes	18th ☿ 60° ♂ „ ♀ □ ♂ 19th ☉ 45° ♓

DATE.	WEATHER.	PLANETARY POSITIONS.
April 20th.	The harbour of Vera Cruz visited by a fearful gale, lasting many hours, and doing great injury to the shipping .	20th ☿ 60° ♓ 21st ☉ 135° ♄ „ ☉ 45° ♀
„ 23rd.	A hurricane of great violence prevails on the Mexican coast	„ ♀ ☌ ♄ 23rd ☉ 135° ♃ „ ☿ eq. dec. ♃ „ ♀ ☌ ♃ 24th ♂ 120° ♓
May 6-7.	The Midland counties of England visited by a most violent thunderstorm .	6th ☉ ☌ ☿ et 120° ♄ 7th ☿ 120° ♃ 8th ☉ 120° ♃ 9th ♀ on Equator
„ 20th.	Goruckpore visited by a fearful hurricane, which throws down the barracks of H. M.'s 20th regiment, killing four soldiers	20th ☿ ☌ ♓ 21st ☿ □ ♄
„ 23rd.	[A shock of earthquake is felt at Cape Town]	22nd ☿ □ ♃ „ ♀ ✶ ♓
„ 28th.	[A great shock of earthquake is felt at Callao and Luna]	27th ☉ □ ♂ 28th ♄ □ ♓ 29th ☽ ☌ ♓
June 11th.	Paris visited by a violent thunderstorm	9th ☉ □ ♃ 12th ♂ ☌ ♄ „ ☉ eq. dec. ☿
„ 16th.	[The Island of Makian, in the Eastern Archipelago, has been completely laid waste by a volcanic eruption, and great part of its inhabitants, numbering 4,000 killed]	15th ♂ eq. dec. ♄ 17th ♂ ☌ ♃
„ 19th.	A waterspout, which in its passage does great damage, traverses a tract of country to the extent of a mile square, and finally bursts in the sea between Gravelines and Dover . . .	19th ♀ 120° ♄ „ ♀ 60° ☿ 20th ☿ stationary
July 1st.	About this date very fearful gales prevail off the coasts of South Africa .	July 3rd, ☉ eq. [dec. ♓
„ 5th.	Deal visited by a violent hail and thunderstorm, which causes great damage .	„ ☉ ☌ ☿
„ 10th.	[Accra visited by a very severe earthquake]	10th ☉ 60° ♄ 11th ☉ 30° ♓
„ 23rd.	A farm-labourer is killed by lightning at Everthorpe, Yorkshire . . .	23rd ♂ eq. dec. ♆ 24th ♂ on Equator

DATE.	WEATHER.	PLANETARY POSITIONS.
July 27th.	Whampoa and Canton visited by a typhoon of terrific violence, causing fearful havoc to life and property; upwards of 40,000 persons perish at Canton . .	25th ♂ eq. dec. ♆ 27th ☉ 45° ♓ „ ☉ 120° ♆ 28th ☉ 45° ♄
Aug. 2nd.	Paris visited by a violent thunderstorm	3rd ☉ 45° ♅
„ 7th.	London visited by a terrific gale of wind, accompanied by torrents of rain .	7th ☉ 120° ♂ „ ☉ 36° ♄ 8th ☿ 120° ♆
„ 10th.	A violent storm, attended with torrents of rain, and one of the most disastrous ever known in that country, bursts over Algiers, one life lost, several persons seriously injured, and many public and private buildings entirely devastated	11th ☉ 135° ♆ 11th ♂ eq. dec. ♅ 12th ☉ 60° ♓ 13th ☉ 30° ♀
„ 15th.	Mazamet, in the Tarn, visited by a hurricane, accompanied with thunder and rain, which causes the waters of the Aronette to rise 30 feet above their usual level, loss of seven lives and much property	14th ☉ 30° ♄ „ ♀ 60° ♄ „ ☿ 120° ♂ 15th ☉ 36° ♅ 16th ☿ 60° ♓
„ 19th.	During a terrific storm and a waterspout near Villarobledo, province of La Mancha, 180 metres of the rails of the line from Madrid to Alicante are stripped up, the mail train comes up and dashes off the line, several persons killed and many injured	19th ☉ ☌ ☿
„ 30th.	Corfu visited by a brief but terrific hail-storm, which does great damage .	Sept. 1st ☿ □ ♓ „ ☿ eq. dec. ♄ 2nd ♂ stationary
Sept. 2nd.	Tremendous hail-storm in Wilts [a shock of earthquake felt at Lisbon] . .	3rd ☿ ☌ ♄, et eq. dec. ♂
„ 10th.	A fearful thunderstorm and hurricane occur at Toulon, causing great damage	6th ♅ on Equator 7th ☿ on Equator 9th ☿ ☌ ♅ et ☍ ♆ 10th ☽ ☌ ♂ 11th ☉ 150° ♂ „ ☿ eq. dec. ♂
„ 15th.	A waterspout, causing very serious damage, bursts over Barcelona . .	13th ☉ □ ♓ 15th ☽ ☌ ♓ 16th ☉ eq. dec. ♂
„ 19th.	An extraordinary meteor is seen in England	18th ☿ ☍ ♂ 19th ☉ ☌ ♄
„ 20th.	H.M.S. 'London' is struck by lightning in the Bay of Naples without being damaged	20th ☉ eq. dec. ♅

DATE.	WEATHER.	PLANETARY POSITIONS.
Sept. 28th.	Paris visited by a violent thunderstorm	28th ☉ eq. dec. ♂
Oct. 6th.	A very magnificent display of Aurora Borealis is seen in England. Barbadoes visited by a terrific thunderstorm	6th ☉ ☌ ♂
„ 7th.	The South of France visited by a terrific thunderstorm, which causes great damage at Toulon and Marseilles .	7th ♃ eq. dec. ♄ „ ☽ ☍ ♂
„ 11th.	Montpellier and the surrounding country visited by a violent thunderstorm, accompanied by torrents of rain, which causes great damage and the loss of some lives	11th Venus on the Equator
„ 12th.	Five men drowned by the capsizing of a boat at the New Passage, near Bristol	12th ♂ ☌ ♃
„ 13th.	[Shocks of earthquake felt at Fayai, which continue daily for some time] .	13th ☿ eq. dec. ♆ „ ☽ ☍ ♅
„ 15th.	Worcestershire visited by a severe thunderstorm	14th ☉ 120° ♅ „ ☿ eq. dec. ♂
„ 19th.	The Metropolis and many other parts of England, visited by a fearful and most destructive gale, by which some lives are lost. France also suffers greatly by the hurricane. The 'Lotus' is totally wrecked off Chale, and ten lives lost	16th ☿ eq. dec. ♄ et „ ☿ stat. [☌ ♂ 18th ☿ ☍ ♃ 19th ☿ eq. dec. ♃ 20th ☽ on Equa.
„ 23rd.	The 'Hindoo' driven ashorn at Faunby	23rd ☉ 30° ♄, ☽ ☍
„ 25th.	[A violent shock of earthquake at Eaux Chades, in the Pyrennees, and in many other neighbouring places] . .	24th ♄ ☌ ♆ [☿ 25th ☿ 120° ♅ 26th ☉ 150° ♆
„ 26th.	A French war steamer, five transports, and 15 merchant ships wrecked off Vera Cruz, with great loss of life . .	27th ☉ ☍ ☿ 28th ☉ 135 ♅
„ 29th.	Nice visited by a violent hurricane, St. Lucia visited by a fearful hailstorm, for the first time	„ ☉ eq. dec. ☿ 30th ☉ 36° ♄ „ ☉ 150° ♂
Nov. 6th.	A most violent snow-storm, lasting 24 hours, extends from Maine to Virginia and Kentucky	5th ☿ stationary 6th ♂ stationary „ ☉ 144 ♅
„ 7th.	The Australian steamship is totally wrecked during a fog by running on the rocks of Green Cape . .	7th ♄ ☌ ♆
„ 19th.	The mail-steamship 'Colombo' is totally wrecked on Minicoy Island, 8° 17′ N. lat., 73° 7′ E. long. . . .	19th ♄ eq. dec. ♆

DATE.	WEATHER.	PLANETARY POSITIONS.
Nov.22nd.	The ship 'William,' 650 tons, founders at sea near St. John's River; 2 boys only of a crew of 21 escape. The royal mail steamer 'Avon,' while lying alongside of the wharf at Colon, is driven on shore by a fearful storm, and becomes a total wreck	21st ♀ 36° ♑
„ 24th.	A violent hurricane, causing many disasters, occurs at Toulon . .	24th ☉ 120° ♆ „ ☿ 135° ♆ 25th ☉ 60° ♄
„ 30th.	About this date a violent gale occurs at Manilla, during which 10 ships are lost	26th ☉ 45° ♑ „ ♑ 120° ♅
Dec. 12th.	Toulon visited by two violent hurricanes, causing great damage . . .	10th ☉☌♅ et ♂♀ 11th ☉ eq.dec. ♅ 12th ☉ eq. dec. ☿ „ ☿ eq. dec. ♅ „ ☿ 120° ♂
„ 14th.	A very brilliant display of the Aurora Borealis is seen in many parts of England and France	14th ☉ 60° ♑ 15th ☿ ☌ ♅
„ 19th.	A violent gale, lasting three days, sweeps over the Metropolis and N.W. of England, several lives lost . . .	17th ☿ ✶ ♑
„ 20th.	St. Valery-sur-Somme visited by a violent storm. Paris and any many other parts also suffer from it. The 'Life Guard' steamship founders at sea off Yorkshire coast; all on board (50) perish .	21st ♂ ✶ ♅ 22nd ☉ ♂ ☿
„ 24th.	Temperature at St. Petersburg unusually severe	25th ☿ extreme declination
„ 27th.	About this date there is a heavy fall of snow in Majorca, a fact unparalleled for many years	„ ☿ □ ♄ 27th ☉□♄
„ 31st.	The iron-clad battery 'Monitor,' which in tow of the steamer 'Rhode Island,' started from Fortress Monroe on the 29th, goes down off Cape Hatteras, during a terrific storm, in 45 fathoms of water, with 16 of her officers and crew.	Saturn on the Equator.

From this table we learn that the SUN was in aspect to SATURN on two occasions when gales raged; 1 *terrific* gale; 1 *violent* gale, 3 *hurricanes;* 1 thunderstorm; 1 *terrific* thunderstorm, and 1 snowstorm.

SUN to JUPITER.—1 gale, 2 *violent* gales, 3 *hurricanes*, 2 thunderstorms, 1 *terrific* thunderstorm, and 1 hailstorm.

SUN to URANUS.—2 *fearful* gales, 2 *hurricanes*, 2 thunderstorms, 3 snowstorms, 1 hailstorm, 1 severe frost, and 1 waterspout.

SUN to MARS.—1 *terrific* gale, 1 hurricane, 2 thunderstorms, 3 *terrific* thunderstorms, and once when great heat prevailed.

SUN to MERCURY.—3 *terrific* gales, 1 *violent* gale, 1 *fearful* gale, 3 *hurricanes*, 2 thunderstorms, and 2 *terrific* thunderstorms.

SUN to VENUS, 1 snowstorm, 1 heavy rain, 2 floods.

SATURN on the EQUATOR.—1 terrific storm.

SATURN stationary.—1 heavy rain.

MARS to URANUS.—1 *violent* gale, 1 *fearful* gale, 1 *hurricane*.

MARS to SATURN.—1 thunderstorm.

MARS to JUPITER.—1 gale, 2 thunderstorms.

MARS *stationary*.—2 hailstorms, 1 snowstorm.

MARS on EQUATOR.—1 thunderstorm, 1 *typhoon*.

MERCURY to URANUS —2 *fearful* gales, 2 hailstorms, and 3 *hurricanes*.

MERCURY to SATURN.—1 *terrific* gale, 3 hailstorms, 1 thunderstorm, 1 *terrific* thunderstorm, and one severe frost.

MERCURY to JUPITER.—1 *violent* gale, 2 *hurricanes*, 1 thunderstorm, 1 *terrific* thunderstorm, 1 great heat.

MERCURY to MARS.—1 *fearful* gale, 2 *hurricanes*, 1 thunderstorm.

MERCURY on EQUATOR.—1 *hurricane*, 1 thunderstorm, 1 waterspout.

MERCURY *at extreme declination*.—1 severe frost.

MERCURY *stationary*.—1 gale, 1 *hurricane*, 1 *thunderstorm*, 1 hailstorm, 1 snowstorm, and 1 waterspout.

VENUS on EQUATOR.—2 floods, 1 heavy rain.

VENUS *stationary*.—2 floods.

VENUS to URANUS.—1 inundation.

VENUS to SATURN.—1 waterspout.

To simplify these coincidences we have placed all gales (of whatever force) under one heading; all storms (of whatever

character) under another heading; and all waterspouts, floods, inundations under a third heading; in the following table:—

Aspects, &c.	*Gales.*	*Storms.*	*Floods.*
Jupiter to Sun	6	4	—
Saturn to Sun	7	3	—
Uranus to Sun	4	6	1
Mars to Sun	2	5	—
Mercury to Sun	8	4	—
Venus to Sun	—	1	3
Saturn on Equator . . .	—	1	—
Saturn stationary . . .	—	—	1
Mars to Uranus	3	—	—
Mars to Saturn	—	1	—
Mars to Jupiter	1	2	—
Mars stationary	—	3	—
Mars on *Equator* . . .	1	1	—
Mercury to Uranus . .	5	2	—
Mercury to Saturn . . .	1	5	—
Mercury to Jupiter . . .	3	1	—
Mercury to Mars	3	1	—
Mercury on Equator . .	1	1	1
Mercury stationary . .	2	3	1
Venus on Equator . . .	—	—	3
Venus stationary . . .	—	—	2
Venus to Uranus . . .	—	—	1
Venus to Saturn . . .	—	—	1
Total . . .	47	44	14

So that we find the 'electric' planet Mercury in aspect or position on 23 occasions when gales raged, and on 17 occasions when storms occurred.

Mr. Saxby gives (Chap. VIII) "details of *all* mention of weather made by Captain McClintock, in 1857 to 1859, in the Arctic Circle," and after shewing the coincidences of lunar positions in 33 cases out of 37; "one was doubtful, and three were decidedly (so far as such meagre data can decide) *not* at Lunar

periods." Mr. Saxby remarks (p. 70), "Why this is not mere "coincidence! it is proof! and as such I beg to be allowed to "consider it *until these coincidences can be explained by any other "man living or by any other system.*"

We accept this challenge, and will shew the coincidence of certain planetary positions at the given periods; *accounting for the three instances of failure of the 'lunar-weather-system.'*

"Abstract of *all* Special Notices of Weather in Captain M'Clintock's Arctic Narrative, 1857 to 1859."

1857. Aug. 7.	Gale yesterday, to day changed to calm, foggy	7th ☉ □ ♃ [*Not Lunar*]
„ 15 to „ 17	Anxiously looked-for N. wind sprung up, &c.	15th ☉ 30° ♄ 17th ☿ 120° ♃
„ 30.	Gale set in, lasted 48 hours . .	26th Mercury on Equator Sep. 1 ☉ 45° ♃
Sept. 9 to „ 13	Gale, and low barometer, cleared up on 13th	8th ☉ 120° ♃ 13th ♂ eq.dec. ♃ „ ☿ 150° ♃ [*Not Lunar*]
„ 18.	N.W. winds set in	18th ☿ station. „ ☉ 60° ♄
Oct. 24.	Furious gales and brilliant meteor	24th ☉ 45° ♂ 27th ♄ 60° ♅
Nov. 19.	Heavy southerly gale . . .	19th ☉ ☌ ☿
„ 21.	Gale changed to N.E. &c. . .	„ ☉ ☍ ♅ 20th ☉ 120° ♄
Dec. 4.	'Remarkable paraselena' . .	4th ☉ 135° ♄
„ 17. „ 18.	Much aurora	18th ☉ 150° ♄ „ ☉ 150° ♅
„ 28.	Symptoms of *coming* gale . .	28th ☿ ☍ ♄ 31st ♂ □ ♄
1858. March 1.	Winter temperature may be said to have passed away by *February* 10	Feb. 8th ☉ eq. dec. ♂ 12th ☉ eq.dec. ♃
Feb. 24.	Fearful gale of wind . . .	24th ♂ 120° ♄ 25th ☉ 135° ♄

March 3-4.	Well-marked revolving storm .	2nd ☉ 60° ♃ 3rd ☿ □ ♂ 4th ♂ ☌ ♅ ,, ☿ □ ♅
,, 23.	*Yesterday*, very heavy S.E. gale . 21st ☿ ✶ ♅	25th ☉ ♁ ☿ ☿ on Equator
,, 27.	Strong N.W. gale, with return of cold weather	26th ♂ eq.dec.♅ ,, ☿ 135° ♄
April 4.	Furious gale, very cold . . .	2nd ☿ □ ♄ 5th ☿ 30° ♅ ,, ☿ 144° ♂
,, 17. ,, 18.	Northerly gale, blows hard . .	17th ☉ 30° ♅ ,, ☿ eq. dec. ♅ 19th ☿ eq.dec. ♂
,, 24.	Strong S.E. breeze, snow, &c. .	22nd ♃ 60° ♄ 23rd ☿ ♁ ♃, et 60° ♄
May 8.	Gale and heavy sea *fast rising* .	8th ☿ 60° ♄ 9th ☿ eq. dec. ♃
,, 14.	'Summer just burst upon us' .	15th ☉ eq.dec. ♃
,, 21.	Southerly winds set in, and continued for six weeks	19th ☉ ♁ ♃ 20th ☉ ♁ ♅ 23rd ♃ ♁ ♅
July 3.	Westerly wind blew freshly . .	2nd ☿ 30° ♅ 3rd ☿ ext.dec.N. and perihelion
,, 30.	Gale and deluge of rain . . .	Aug. 1st ♄ 60° ♅
Aug. 7-9.	Heavy gale	6th ♂ eq. dec. ♃ 7th ☉ 72° ♅ 8th ☽ ♁ ♄
,, 25 to ,, 28	Change of wind, moderate on 28th	24th ♂ 120° ♄ 27th ☉ 90° ♅
Sept. 22.	Very vivid flash of lightning (most unusual occurrence) . . .	23rd ☿ stat. ,, ♂ 135° ♄
Oct. 19	On 17th to 18th a N.W. gale of great violence, *abated* on 18th. Captain M'Clintock says it generally blows a gale of wind here (being then in Ballot's Strait)	17th ☉ 72° ♄ 18th ♂ 150° ♄

Nov. 2.	N.W. gale set in, lasted for 70 hours. Therm. down to 12° . . .	2nd ☿ 90° ♄ 4th ☉ 90° ♄
1859.		
Feb. 8.	'For the last four days strong winds and intense cold' . . .	8th ☿ 120° ♅ 11th ♂ 120° ♄
,, 18.	'The old N.W. wind sprung up, and continued for *several days*, and the Therm. fell to 18°' . . .	18th ☉ 90° ♅ 20th ♂ 45° ♅
March 18.	It blew a N.W. gale . . .	18th ☿ 120° ♄ 21st ☉ 60° ♅ ,, ♂ 90° ♄
April 25 to 27	Very heavy *southerly* gale . .	26th ☉ 90° ♄ ,, ☉ 45° ♃ 27th ♂ ☌ ♅ [*Not Lunar*]
May 7.	'Bad weather has now fairly set in, accompanied by a most intense degree of cold'	4th ☿ stat. 5th ♀ 60° ♂ ,, ☽ ☌ ♄ 7th ☿ in aphelion
,, 13.	'A most furious gale lasted until the morning of 16th, and it is snowing for a wager'	14th ♂ eq.dec. ♃ 17th ☉ eq.dec. ♄
Aug. 3.	N.E. gale sprung up with two claps of thunder (rarely occurs in these latitudes)	2nd ☿ □ ♅ 4th ♂ 60° ♅ 5th ☉ eq. dec. ♄
,, 8.	*Gale from westward* . . .	9th ☉ ☌ ♄
,, 15 to 17	East wind died away, and west wind sprung up into a smart gale, falling calm on 17th	16th ☿ stat.

Mercury was in 'aspect' on *twenty-one* occasions. The rare aspect (of 60°) of Saturn to Uranus brought "furious gales" on Oct. 24th, 1857; and a "gale and deluge of rain" on July 30th, 1858.

The three gales which Mr. Saxby marked as "not lunar" occurred, 1, August 6th, 1857, Sun 90° from Jupiter; 2, Sept. 9 to 13, 1857. Mars, Jupiter, and Mercury in aspect; 3, the "very heavy *southerly* gale" of April 25 to 27, 1859, the Sun 90° from Saturn and 45° from Jupiter, and Mars in conjunction with Uranus. The last one was very important, yet the lunar theory *fails to account for it!*

Sir John Herschel, in reference to atmospheric waves, says,

"It would appear from the researches of Mr. Birt, that a very "remarkable wave of this kind (to which he has given the name of "'the great November wave') passes annually over these islands "and the adjacent regions (embracing probably the whole of Europe "and the seas on its north-west coasts in its range), the crest ex- "tending in a direction from N.E. to S.W., the direction of pro- "gress (at right angles to this, or) from N.W. to S.E., the velocity "about nineteen miles per hour. Both the breadth and depth of this "wave are on a vast scale. The whole wave occupies about fourteen "days in its transit, the crest passing over London about the middle "of November, so that its total breadth cannot be less than 6,000 "miles, while the extent of barometric elevation from its trough to "its crest seldom falls short of an inch, and occasionally amounts to "double that quantity. What is no less remarkable, there is a cer- "tain region (in which London is included), over which the rise and "fall of the barometer during the transit of the wave exhibit a con- "siderable resemblance, so that a section of it, in the direction of "its advance, would be a symmetrical curve, the middle crest being "preceded and followed at about five days' interval by two lower "ones, and the beginning and the end marked by deep depressions. "The researches of M. Le Verrier leave no doubt that the great "Crimean storm of the 14th of November, 1854, of disastrous me- "mory, was part and parcel of this phenomena" (Meteorology, par. 80).

And in the paper on "the weather and weather prophets" in *Good Words* for Jan. 1864. Sir John Herschel said, referring to the storm of Oct. 30-31st, 1863,

"Part and parcel, no doubt, of that great periodical phœnomenon, "whose recurrence under the name of 'the November atmospheric "wave,' is beginning to be recognized as one of the features of our "European weather table—a vast and considerably well-defined at- "mospherical disturbance, peculiar, it would seem, to this portion of "the globe, though originating, as we shall see reason to believe, in "the opposite hemisphere, and of which the gale of the Royal "Charter (October 25th, 1859); the great Crimean hurricane of "disastrous memory (November 14th, 1854); and the still more "awful storm of December 8, (N.S.) 1703, the greatest which has

"ever swept this island—may be considered as shadowing out the "beginning, middle, and end."

"The great Crimean hurricane" occurred under the influence of Mercury in equal declination to Jupiter and Saturn, and the Sun 60° from Jupiter. The "Royal Charter gale" visited us on the day that the Earth passed from the influence of Jupiter to that of Saturn (Sun 90° from Jupiter, Oct. 18th, and the Sun in equal declination with Saturn, November 1st)*, Jupiter being on that day within five minutes of arc from equal declination to Uranus. [The Crimean gale was *not lunar*. The 'Royal Charter' gale occurred two days after the Moon crossed the Equator.]

This 'November atmospheric wave' is very irregular in the periods of its visitation. Last year (1863) it seems to have commenced at the end of October—being coincident with the Solar conjunction of Jupiter. As there will be a Solar conjunction with Mercury on the 10th of November (1864) next, we may expect a severe gale at that period—probably the *recurrence* of the 'November atmospheric wave.'

The disastrous hurricane of Dec. 2-3, 1863, may suggest the existence of a *December* atmospheric wave; for it is very probable that we shall witness very heavy gales—probably accompanied by thunder and lightning—at the corresponding period of 1864, because there will be a Solar conjunction with Jupiter on the 30th of Nov., and the Earth will pass between the Sun and Mars on Dec. 1st and between Mars and Jupiter on the 2nd inst. Indeed, the first five days of December will be remarkable for stormy aspects.

In concluding this chapter, we will take the storms mentioned in Admiral Fitz Roy's *Weather-Book*, and shew their coincidence with certain planetary *aspects*.

At pp. 334-5 there is an account of a storm of wind which commenced at 2^h A.M. of April 12th, 1846—*Mars* 60° *from*

* Another storm occurred on the 1st and 2nd of November (Mars crossing the Equator, Oct. 31st). "A good barometer in Dublin fell to 28·01, at 8 A.M. while the wind was W."—*Weather-Book*, p. 328.

Uranus (11th inst.)—and "from that time, stormy weather, with "a succession of heavy gales, prevailed during many days"—*the Sun* 60° *from Saturn, and in conjunction with Mercury* on the 19th inst.

At pp. 257-64, an account is given of a tempest at Barbadoes, taking place August 10-11, 1831. "The whole face of the "country was laid waste; no sign of vegetation was apparent, "except here and there small patches of a sickly green. The "surface of the ground appeared as if fire had run through the "land, scorching and burning up the productions of the Earth. ". . . . . During the severest period of the hurricane at Bar- "badoes, on the night of August 10th, 1831, two *negroes were* "*greatly terrified by sparks passing off from one of them*. This took "place in the garden of Codrington College; and it was related "on the spot where it happened, by the Rev. Mr. Pindar, the "Principal of that College. Their hut in the garden had just "been blown down, and in the dark they were supporting each "other, while endeavouring to reach the main building*." On August 10th, 1831, *the Sun was in opposition to Jupiter*, and on the 12th inst. *Mars was in conjunction with Saturn.*

"At Antigua a hurricane happened on August 12, 1835; . . . "the barometer was observed to fall 1·4 inch. . . . . Trees were "blown down, *as if forming lanes.*" *The Sun was* 60° *from Saturn* on the 12th inst., *Mars* 150° *from Uranus on the* 14*th, and crossed the Equator on the* 17*th inst.*

At p. 266, we read of a hurricane having occurred to the eastward of Barbadoes on July 10th, 1837. *Saturn stationary;* and the Sun in equal declination with Mercury.

A hurricane "passed over Barbadoes on the morning of July "26th, 1837; at ten the same night it was at Martinique, by "which hour it was all over Barbadoes; at midnight on the 26th, "and morning of the 27th it reached Santa Cruz. By July 30th "it reached the Gulf of Florida, where some vessels were wrecked

* The newspaper reports of this hurricane stated that 5,000 lives were destroyed by it!

"by it, and many damaged; it then took a more northerly "direction, being on August 1st at Jacksonville, in Florida*." *Mars on the Equator, Mercury* 60° *from Mars* on the 26th. *Mercury in conjunction with the Sun* on the 28th [*not lunar*].

Another hurricane "was at Antigua on August 2nd, 1837; "by the 5th and 6th it was also on the coasts of Georgia and "Florida, crossed the line of the other hurricane, nearly meeting "it; and it seems to have touched Pensacola on August 8th." *Sun* 90° *from Saturn* on 3rd inst. [*not lunar*].

At pp. 282-3 of the *Weather-Book*, there are accounts of "a tremendous gale" on August 21st, 1837. *Sun in conjunction with Jupiter* on the 22nd.

"A hurricane swept over the town of Apolachicola, Aug. 31, "1837, and half destroyed it. Nearly every house was un- "roofed; a number of the upper stories were blown down, and "many houses levelled. The storm commenced on the after- "noon of August 30th, but was not severe until four on the "morning of the 31st, when it became very violent until seven "P.M. The wind was from the *south-west to north.*

"This terrible tempest completely destroyed the town of St. "Mark. The lighthouse was almost the only building left stand- "ing, yet the town of St. Joseph suffered very little in the gale." *Sun in opposition to Uranus* on the 30th. Mercury and Venus having just crossed the Equator [*not lunar*].

"Mr. Williams, the well-known missionary martyr, witnessed "a hurricane at Rarotonga, one of the Hervey Islands (19° S.

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* "The brigantine 'Judith and Esther' sailed from Cork, bound to Kingston, Jamaica, on July 2nd, 1837. A fair wind prevailed until August 1, on which day was experienced a most dreadful hurricane, of which the following are particulars:—'*for nearly an hour we could not observe each other, or anything but merely the light; and most astonishing, every one of our finger-nails turned quite black, and remained so nearly five weeks afterwards!*' . . . . . 'whether it was from the firm grasp we had on the rigging or rails, we could not tell, but our opinion is, that the whole was caused by an *electric* body in the elements. *Every one of the crew was affected in the same way.*' "

"lat., 160° W. long.), Dec. 21st and 22nd, 1831." *Saturn stationary.*

"On February 28th and March 1st, 1818, the 'Magicienne' "frigate was lying at Mauritius, moored in the harbour of Port "Louis: and on that occasion, this frigate and forty other vessels "went on shore, or were sunk. . . . . In the accounts given of "it" (the storm) "we find that, as was observed at Barbadoes "in 1831, '*the rain tasted salt;*' and it is added, that next day, "'*the rivers ran with brackish water.*'" . . . . . The barometer "sunk lower than ever was known, and most of those who "observed it were unable to account for the notice it gave in so "extraordinary a manner." Feb. 26th, *Sun* 60° *from Jupiter;* 27th, *Sun in conjunction with Saturn.* March 3rd, *Mars in opposition to Uranus.*

"In a hurricane of Feb. 23, 1824, at Mauritius, upwards of "thirty vessels were wrecked." *Jupiter stationary on the tropic* (*Cancer*) *i.e. extreme N. declination.*

"In a succession of hurricanes on March 6th, 7th, and 8th, 1836, the barometer at Mauritius ranged through one inch and seven tenths." *Mercury stationary* on the 7th inst.

We will conclude this chapter with indications of the periods most liable to atmospherical disturbance in the months of November and December, 1864, and January, February, March, and April, 1865:—

DATE. 1864.	ASPECTS.	PROBABLE WEATHER.
Nov. 9th, 10	☽ on Equator. ☿ ☌ ♂ ☉ ☍ ♄ et eq. dec. ☿	9-11. Very stormy and wet.
„ 11	♂ eq. dec. ♅ ☉ 30° ♀	
Nov. 21, 22	☿ ☍ ♃ Venus extreme S. declination	21. Strong wind and meteors 22. Wet.
„ 25, 26	☿ ☌ et eq. dec. ♂ ☉ eq. dec. ♃ ☽ ☍ ♄	Strong wind. Lightning or meteors

DATE.	ASPECTS.	PROBABLE WEATHER.
Nov. 30	☉ ☌ ♃. ☽ ☌ ☿	Very high temperature, followed by heavy hail or thunderstorms; then gales, electric disturbance, &c.
Dec. 1	☉ ☍ ♂	
,, 2	♂ ☍ ♃. ♀ 36° ♃, et 144° ♂. ☽ [☌ ♀	
,, 3	☉ 45° ♄	
,, 4	♂ eq. dec. ♅	
,, 5	☿ ☍ ♅ et 60° ♄	
,, 7	Mercury extreme S. declination	
,, 13.	♄ 120° ♅. ☽ ☌ ♅ . .	Gales and snow—or intense frost.
,, 19.	☉ ☍ ♅ et 60° ♄ . .	Intense frost or severe gales.
,, 30.	Mercury stationary. ☽ ☌ ☿ .	Windy.
1865.		
Jan. 5th	Mars stationary	Jan. 5-7. High temperature and hail-showers or meteors 8-9. Severe gales followed by frost.
,, 6	☉ 30° ♃	
,, 7	☉ eq. dec. ♃	
,, 8	☉ ☌ ☿. ☽ ☌ ♂	
,, 9	☽ ☌ ♅	
,, 19	☉ □ ♄ et eq. dec. ☿ ☿ stationary	Severe frost. Strong wind, and probably snow storms.
Feb. 3.	Venus on Equator	Much rain, or snow, and strong wind.
,, 8	☿ 150° ♅. Saturn stationary	8-10. Probably sharp frost, followed by a thaw on 11-12, with strong wind
,, 11	☿ □ ♄	
,, 12	☉ 60° ♃	
,, 14	☉ 120° ♅	Strong wind or sharp frost.
,, 18	☉ 120° ♄	Sharp frost (and meteors ?) Strong wind.
,, 19	☿ 120° ♂	
,, 20	☽ ☌ ♃ et ☍ ♅	
,, 25	☉ eq. dec. ♄ ♃ ☍ ♅	Very stormy.
,, 28	☿ 60° ♃ et 120° ♅	Strong wind. Meteors
March 2	Uranus stationary	Sharp frost and strong wind.
,, 3	☿ 120° ♄	
,, 10	☉ □ ♂ ☿ eq. dec. ♄	Thaw, and strong wind.

DATE.	ASPECTS.	PROBABLE WEATHER.
March 16	☉ □ ♅ et eq. dec. ♆	A very stormy period.
,, 17	☿ □ ♅	
,, 18	☉ □ ♃ et ☌ ☿. ☿ eq. dec. ♆	
,, 19	☉ 150° ♄	
,, 20	☉ eq. dec. ☿. ☽ ☌ ♃ et ☍ ♂	
,, ,,	Mercury on Equator	
,, 22	♂ ☌ ♅. ☿ eq. dec. ♆	
,, 26	Mars' extreme N. declination	Very stormy, but *high* temperature
,, 27	♃ 60° ♄. ☽ ☌ ☿	
,, 28	♂ ☍ ♃ et 120° ♄	
,, 29	☿ eq. dec. ♄	
April 15	Jupiter *stationary*	Temperature high on 15-16 and 18-19. Gales on 16-17.
,, 16	Venus *stationary*, at ext. N. dec.	
,, ,,	☉ 60° ♅. ☽ ☌ ♃ et ☍ ♅	
,, 17	☉ ☍ ♄. ☽ ☍ ♂	
,, 19	☉ 120° ♃.	

The above periods will be very interesting to the students of Astro-Meteorology; they will afford them excellent opportunities of ascertaining the influence of these planetary positions, and also for the improvement of the science.

CHAPTER XIII.

EARTHQUAKES.

When were the winds
Let slip with such a warrant to destroy?
When did the waves so haughtily o'erleap
Their ancient barriers, deluging the dry?
Fire from beneath, and meteors from above
Portentous, unexampled, unexplained,
Have kindled beacons in the skies; and the old
And crazy Earth has had her shaking fits
More frequent, and foregone her usual rest.
* * * * * * *
The rocks fall headlong and the valleys rise.

Cowper.

The Earthquake, in England, of October 6th, 1863, awakened a spirit of enquiry into the *causes* of these phenomena. It was stated in the *Daily Telegraph* (of Oct. 19th, 1863) that 234 earthquakes have been recorded in the British Isles, 110 of which have occurred during the first half of the present century! And again:—

"Earthquakes have frightened our forefathers, and may over-"whelm us. The fatal explosion may happen this or next year; it "may not happen in this century . . . . . but we are not the less "certainly living over a mine ready to be sprung, and no one can "tell when or where the fatal match will be applied."

These words are somewhat antagonistic to those of a previous paragraph, viz:—

"It would appear from the great and regular frequency of "smaller shocks, from the tendency they have to recur in certain "districts and zones, and from the comparative periodicity of the "greater convulsions, that earthquakes are governed by some cos-"mical influence away from the Earth, and in harmony with the "cyclical periods connecting the Earth with our satellite, the Sun, "and the larger planets. We know that the relative positions of

"the nearer heavenly bodies affect the tidal wave of the sea, and it "is not improbable that, under the influence of the same attracting "causes, the interior molten portions of the Earth are similarly "affected by a tidal influence which occasions a periodic paroxysmal "action."

If such be the case (as we believe and endeavoured to shew by letters on the subject that appeared in the *Northampton Mercury* of Oct. 10th, and Dec. 5th, 1863) it *is* possible to *foretell* when Earthquakes are likely to take place by carefully noting the relative positions of the planets, the Earth, the Sun, and the Moon, at the periods of former visitations, and calculating when similar positions will recur.

It has been observed, for instance, that "earthquakes generally happen immediately after an eclipse, and when there are planets in *Taurus* and *Scorpio*"; and that "comets are often preceded by earthquakes, from which it is inferred that they are intimately connected with them as regards cause and effect. For two years previous to the approach of the great comet of Halley, it was observed that earthquakes and other phenomena were especially frequent." On June 1st, 1863, there was a total eclipse of the Moon, and, on the 3rd inst., "a terrible earthquake overthrew the city of *Manilla*, and destroyed 10,000 souls."

The Earthquake of Oct. 6th, 1863, occurred a few days after Jupiter entered the sign *Scorpio*. A smart shock was also felt at Antigua, Oct. 5th, at $10^h\ 20^m$ P.M., corresponding to Greenwich mean time, $2^h\ 28^m$ A.M. of Oct. 6th. The following letter, written by Mr. W. H. White, of Camberwell, will explain the planetary positions at the time of the occurrence:—

[From *The Institute and Lecturers' Gazette* for November, 1863.]

METEOROLOGY AND EARTHQUAKES.

To the Editor of "THE INSTITUTE."

SIR,—As a Lecturer on Astronomy, Meteorology, and their kindred branches of scientific research, I beg to send you my notice of Earthquakes and their causes, meteorologically considered. I

am emboldened to do so from the encouragement you have given to Scientific Lecturers, in your leader in the October number of *The Institute*, and especially to those whose Lectures embrace that useful and valuable branch of science — *Meteorology*, a branch of paramount importance to every cultivator of the soil—to every one "who goes down to the sea in ships"—to every excursionist and pleasure seeker—indeed, to every one, as the atmosphere is the source of life to all.

But little seems to be scientifically known as to the *origin* of Earthquakes, or how the terrible "*tremblements du terre*" are physically brought into action.

Old Descartes, Father Kircher, and others, supposed that the Earth contained great cavities at a considerable depth, having a communication with each other, some of which, they supposed, were filled with water, and others with foul air, sulphurous exhalations, &c. &c. These opinions were patent till the year 1750, when a violent Earthquake was felt, not only in London, but in every part of Great Britain. Many theories were then propounded, but among the most rational were those of Drs. Priestly and Stukesly, both of whom attributed Earthquakes to the effect of that most powerful of all agents in nature—*Electricity;* but how the terrible shakings of the Earth were brought about they could not tell. This I will endeavour to shew, by the theory of planetary influence.

On the 2nd of October we find four bodies of our system in conjunction, thus:—

Sun	Earth	Mars	Saturn
O	O	O	O

Now, as the Earth travels with twice the velocity of Mars, and thirty times the velocity of Saturn, it would soon emerge from its conjunctive position, so that on the 6th the planets would be thus situated:—

Sun	Earth	Mars	Saturn
O			O
		O	
	O		

The Earth thus forming angles with Mars and Saturn. The 6th and 7th were the transition days, or those days on which the Earth would leave the combined influences of Mars and Saturn, and receive the first rays of light from the electric planet Mercury,

which was then only four degrees from its inferior conjunction with the Sun and Earth. Now this electric ray of Mercury seems to have acted as the discharging rod to the mundane battery, which appears to have been completely surcharged with positive electricity.

This will be readily understood, if the readers of these remarks will conceive the Earth to be a vast electrical jar, or receiver, which had become highly charged, from the great amount of positive electricity it had acquired during the hot and sunny summer, the the Sun being the well-known dispenser of light, heat, electricity, and probably many other emanations, in the wisdom of Omnipotence, which science has not yet unfolded to the intelligence of persevering man. But, in addition to the electricity imparted to the Earth by the Sun, that amount would be further increased by the electric rays of Mars, while in conjunction, so as to make the Earth an electrical jar charged *plus-positive;* while, at the same time, the negative Saturn was drawing off the electricity from our atmosphere, and rendering it *plus-negative.* These I consider to have been the relative conditions of the Earth, and its circumambient aerial envelope, at the time the earthquake was felt.

As electricity is always striving to restore an equilibrium between the Earth and the atmosphere, the first ray of Mercury's electric light, coming in contact with the solid earth, through the medium of the atmosphere, probably liberated the pent-up electricity; which, in its violent struggle for freedom, produced the trembling of the Earth, as witnessed.

Notwithstanding I have here advanced an hypothesis, be it remembered, I do not forgot HIM who holds creative powers in His hands, and wields them at His will, and who says to puny man—"My thoughts are not your thoughts."

W. H. WHITE.

Jamaica was visited by an Earthquake on the 8th Nov. 1863.

The Earthquake of Santa Martha and a great eruption of Mount Vesuvius occurred simultaneously on the 22nd of May, 1834. The longitudes and declinations of the planets were:—

	♅ ♒	♄ ♎	♃ ♉	♂ ♈	☉ ♊	♀ ♊	☿ ♉	☽ ♏
Long.	326° 30′	184° 10′ R	51° 30′	9° 58′	60° 51′	80° 12′	48° 20′	234° 39′
Dec	13 22	0 43	17 21	2 41	20 21	23 56	16 10	16 15

At the lunation nearest to the Solar ingress into *Aries* (March 25th, 1834, $6^h\ 13^m$ A.M.) the longitudes and declinations of the planets were:—

	♅ ♒	♄ ♑	♃ ♉	♂ ♒	☉ ♈	♀ ♈	☿ ♈	☽ ♎
Long.	324° 49′	187° 40′ R	38° 0′	325° 12′	4° 7′	8° 27′	10° 13′ R	184° 7′
Dec.	13 55	0 35	13 19	14 12	1 38	2 11	7 10	2 56

Now on comparing these tables it will be found, that at the time of the earthquake Saturn was passing *the exact degree of longitude which the Moon occupied at the lunation*; Mars arriving at the corresponding degree of arc in declination to that of the Moon at the lunation.

On the 15th of July, 1853 (at $2^h\ 15^m$ P.M.) an earthquake occurred at Cumana, destroying hundreds of lives. On the 6th of June, 1853, the Sun was eclipsed in *Gemini* 76°, Saturn, Mars, and Uranus being in *Taurus*. On the day of the earthquake *Jupiter arrived at the opposite point in the Zodiac* (*Sagittarius* 256°) *to that of this eclipse; Mars at the same time passing over the place of the eclipse* (consequently, Mars and Jupiter were in *opposition*); *and the Moon at the very hour of the earthquake was exactly opposite to the place of Mars at the eclipse*:—

Longitudes of the Planets at the time of the Eclipse.

☉ and ☽	♄	♃	♂	♀	☿	♅
♊ 75° 56′	♉ 54° 30′	♐ 260° 6′ R	♉ 47° 52′	♊ 82° 23′	♊ 67° 42′	♉ 40° 37′

Longitudes of the Planets at the time of the Earthquake.

☉	☽	♄	♃	♂	♀	☿	♅
♋ 113° 9′	♍ 227° 39′	♉ 58° 49′	♐ 255° 42′	♊ 75° 30′	♌ 130° 14′	♌ 139° 25′	♉ 42° 6′

Dr. Goad, in the *Astro-Meteorologica* (published 200 years ago), gave a list of twenty earthquakes which happened while

the planet Jupiter was in *Taurus*. He added:— "I am as sure as I write, that this phenomenon, as great and stupendous as it is, depends upon this celestial appearance—Venus or Mercury with Jupiter."

The following "rules for predicting earthquakes" were published by Capt. Morrison, R.N., in the year 1834. They were deduced from an extensive series of observations:—

1. Earthquakes generally follow close on the heels of eclipses.
2. At the period of the Earthquake, many aspects will be found between the planets in the heavens at the time; also as regards the places of the planets at the previous eclipse, but chiefly the places of the Sun and Moon.
3. Earthquakes happen more frequently when there are planets, especially Uranus, Saturn, Jupiter, and Mars, in the signs *Taurus* and *Scorpio*.
4. If there have been no recent eclipse of the Moon within a month, look to the last eclipse of the Sun.
5. The planet *Jupiter*, in aspect with Venus or Mercury, more especially the conjunction, opposition, and equal declination, has a powerful influence in causing earthquakes, especially if in Taurus or Scorpio.
6. If no eclipse have taken place within three months, look to the planets' places at the last new or full Moon of the quarter; that is, the lunation nearest to the Sun's crossing the tropic or Equator.
7. Earthquakes generally happen when there are *many* planets on or near the tropic or Equator.
8. Earthquakes may always be expected *near the perihelion* of great comets, and when they approach within the orbits of the planets Uranus and Saturn.
9. Let all, or as many as possible, of these circumstances be combined before any very extensive earthquake is predicted.

On the 19th of October, 1865, there will be an eclipse of the Sun. On the 25th the Sun will be in conjunction with Saturn (in *Scorpio*) and Mars will be but 5° past Saturn on that day. Let our readers watch for the results.

"The most awful circumstance in connection with earthquakes "is *the consequent destruction of human life*. In the earthquake

"of Lisbon, which lasted only five minutes, 30,000 people perish-
"ed. An earthquake in Sicily, in 1693, destroyed 100,000 lives.
"It is computed that 40,000 persons were killed in the earth-
"quakes in Calabria, 1783; and in the numerous disruptions in
"Chili, the great centre of terrestrial disturbance, probably not
"less than 150,000 people have perished in the course of two
"centuries."—Fullom. "Marvels of Science," pp. 170-1.

CHAPTER XIV.

COMETS.

Comets have very great influence on the weather. High temperature and dry weather have always been observed to occur coincident with the approach of large comets; and a re-action has been frequently observed on their departure from our Solar system.

In June, 1861, a large comet appeared. The average maximum temperature of the months May, June, July, August, and September was 82°, which was 10° higher than that of the corresponding months of 1860—which was 72°.

The total rain-fall of 1861 was but 16·35 inches (as registered by Mr. White, of Camberwell), the rain-fall of 1860 being 23·47 inches. The rain-fall of 1861 was nearly 8 inches below the average. Rain fell on 139 days in 1861, but on 168 days in 1860.

Large comets modify, and frequently entirely overcome, the pluvial influences of Saturn and Venus, when those planets are in aspect to the Sun at the period of the nearest approach to the Earth of great comets.

When a large comet appears coincident with the formation of aspects between the Sun and Jupiter or Mars, drought may be expected.

CHAPTER XV.

METEORS.

Mark when athwart the ebon vault of night,
The METEORS shoot their flash of vivid light—
From that same quarter will the wind arise,
And in like manner rush along the skies.
If numerous and from various points they blaze
Darting across each other's path their rays,
From various points conflicting winds will sweep
In whirlwind fury o'er the troubled deep.

Diosemeia, line 229.

A WORK on Meteorology would be incomplete were no reference made in it to meteors, auroræ, &c.

We will venture to give what may be called the *astral* theory of the origin of these phenomena, and we think our readers will admit its plausibility. It has been observed through all ages that meteoric displays are especially frequent when the planets Mars, Mercury, Venus, Jupiter, and Saturn are in 'mutual' aspect, one of them aspecting the Sun. This, probably, results from the great amount of electricity which *always* exists in our atmosphere when Mercury, Jupiter, Mars, and Venus are in aspect.

It has been stated that:—"The epochs of the appearance of "the Aurora borealis, and those of magnetic perturbations, "coincide pretty closely. Rarely are auroras exhibited without "magnetic disturbances occurring at the same time, and the "agitation of the magnetic needle indicates the approach of an "aurora. The causes of the two phenomena appear to operate "simultaneously, and they are often accompanied by earth-"quakes in countries exposed to that class of action. Magnetic "perturbations, however, operate over a much wider range than "auroras."—Quetelet, *Physique du Globe*.

In a report of some remarks made by Father Secchi the Roman astronomer on the "Atmosphere and the ether of space," which

appeared in *Cosmos* (Feb. 18th, 1864), the following passage occurred:—

"The phenomena of ordinary electricity carefully studied at "the time of auroras may afford us some light. I am of opinion "that the idea, which is beginning to be accepted, that auroras "depend upon discharges of atmospheric electricity in elevated "regions is correct."

M. De La Rive in *Comptes Rendus*, June 9th, 1862, p. 1171, says, "that auroras are atmospheric phenomena which take "place within the limits of the atmosphere, but not beyond "it." . . . . . "It is known that auroras are accompanied by "more or less intense currents in telegraphic wires. . . . . "There is, however, a great difference in the results obtained "when, instead of observing the currents collected by telegraphic "wires, we study the perturbations of the magnetic needle which "accompany auroral manifestations, as in the latter case there "are neither electrodes nor secondary currents, but only one "direct action of the principal current."

Meteoric stones are not considered by Sir John Herschel to "be formed in, or anyhow collected from, disseminated particles "scattered through the air." But Sir John Herschel says this does not apply to Bolides (great fiery globes), of the foundation of which, he says, the *most* plausible theory "is that which assi- "milates them (as well as the slow-moving 'globes of fire' "mariners are in the habit of talking about, as seen to approach "and sometimes strike their ships in violent thunderstorms), to "the glow-discharge of a very enormous electric reservoir of low "tension, venting itself through an imperfect conductor."

From the opinions and theories quoted above, it is apparent that meteors, auroræ, &c., are dependent upon a large amount of electricity existing in the atmosphere. Then if we shew that there is *always* much generation of electricity, and that meteors are frequently visible, when the before-mentioned planets form certain angles, we may regard these continually recurring coincidences as *cause and effect.*

We will mention a few of these coincidences.

"M. Eudes-Deslongchamps and his son were in their garden at Caen on the 19th of September, when the darkness was suddenly lit up by an intensely blue bolide, the train of which was white." (*Intellectual Observer*, Dec. 1862). *Mercury in opposition to Mars* on the 18th. The *Sun in conjunction with Saturn* on the 19th, and in *equal declination with Jupiter* on the 20th.

"A magnificent meteor was seen on the 27th of November, 1862," and described by Mr. Lowe, F.R.A.S. in the *Intellectual Observer* (Jan. 1863). "At Streatham Hill, London, it had the appearance of being in a state of incandescence, surpassing the electric light in brilliancy, if possible." The *Sun* 45° *from Jupiter;* and Jupiter 120° from Uranus on the 26th Nov.

A splendid aurora was seen at Marseilles and in Northern Italy on the 15th of Decmber, 1862; a writer in *Cosmos* described the sky as of a brilliant gold tint. "When the aurora was at its height, at $6^h\ 50^m$ P.M. a globe of white light twice the apparent size of Venus made its appearance near the pole, and moved slowly towards the horizon from south-east to north-west. A similar globe was seen about half-past eleven. The display lasted for six hours and a half, during which the compass needle was in continuous agitation." (*Intellectual Observer*, Feb. 1863). The *Sun* 60° *from Jupiter* on the 14th*. *Mercury in opposition to Uranus* on the 15th inst.

Mr. Allnatt, of Frant (Sussex), observed an aurora on the night of the 20th of November, 1863. *Mars in conjunction with Jupiter* on the 21st.

The same gentleman observed displays of aurora on the 11th and 17th of April, 1864. The *Sun* 60° *from Uranus; Venus* 120° *from Jupiter*, and in *equal declination with Saturn* on the 11th. *Venus on the Equator on the 17th.*

A splendid meteor was seen in Somersetshire, in Worcestershire, and at Weymouth, at a few minutes before seven in the evening of Dec. 27th, 1863. *Venus in conjunction with Jupiter*,

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* According to a letter in the *Standard*, an aurora was seen at Kensington on Dec. 14th, 1862.

and *Mercury* 60° *from both*, on the 27th. Neptune on the Equator on the 28th.

Coruscations of light were seen on the night of the 5th of October, 1863, a few hours before the earthquake took place.

Ptolemy (Tetrabiblos, Book II, Chap. XIV) wrote a treatise on "*the signification of meteors*," in which he said:—"appearances "occasionally visible in the sky, resembling the trains of comets, "usually indicate wind and drought, in a degree proportionate to "their multitude and continuance.

"Appearances resembling shooting or falling stars, when pre- "sented in one part only, threaten a movement of wind from "that part*; when in various and opposite parts, they portend "the approach of all kinds of tempestuous weather, together "with thunder and lightning. Clouds resembling fleeces of "wool will also sometimes presage tempests; and the occasional "appearance of the rainbow denotes, in stormy weather, the "approach of serenity; in fine weather, storms.—And, in a "word, all remarkable phenomena, visible in the sky, univer- "sally portend that certain appropriate events will be produced, "each harmonizing with its proper cause, in the manner herein "described."

M. Quetelet in the chapter, of his *Physique du Globe*, on "shooting stars," remarks, that it "must be observed that the group of shooting-stars of the 11th and 12th of November has been scarcely noticed for ten years," and he asks, "whether it has actually disappeared, or whether there is a certain periodicity in its returns."

An annual display of meteors, or shooting-stars, has been observed for many years about the 10th of August. The probable cause of these annual displays in August and November is that the Sun arrives at equal declination or conjunction with certain fixed stars (near the ecliptic) of the first or second magnitude.

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* "Sæpe etiam stellas vento impendente videbis
"Præcipites cœlo labi."—&c.

Georgic I, l. 365.

CHAPTER XVI.

HOW TO PREDICT THE WEATHER.

To be able to anticipate the various changes of the weather is, or should be, the end and aim of meteorological science.

The amount of prejudice that exists against weather-prediction is astonishing. An instance of this is shewn by the endeavours—happily, unsuccessful—that have been made to obtain the withdrawal of Government support of the Meteorologic Office, and to disconnect it from the Board of Trade.

Arago said, "Whatever may be the progress of the sciences, "never will observers who are trustworthy and careful of their "reputation, venture to foretell the state of the weather." Arago was "wise in his generation," for it seems to be the fate of every man who predicts variations of the weather to be abused without mercy. Should he obtain successes they are called "lucky-hits," and one failure is sufficient, in the eyes of some people, to outweigh any number of successes. The "weather-prophet" is called an *enthusiast*, and his moral courage termed *fanaticism*. But all the abuse, all the condemnation, all the ex-communications in the world, will never alter the fact that it *is* possible (by observing the oft-repeated coincidences of certain states of the weather with certain relative positions of the planets and the Earth, and by calculating when those particular positions or 'aspects' will recur), to predict the state of the weather.

Rules for Predicting the State of the Weather.

1. Tabulate the *aspects* formed by the Sun, Planets, and Moon in the following manner :—

AUGUST, 1864.

	Solar.	*Mutual.*	*Lunar.*
1		☿ 60° ♄	
2			☌ ☿ 11.57 P.M.
3	eq. dec. ☿	☿ 60° ♅, et 45° ♄	
4			☌ ☿ 8.30 A.M.
5	45° ♅ et 60° ♄	☿ □ ♃ et ♂. ♂ eq. dec. ♃	on *Equator*.
6		♂ ☍ ♃	
7		☿ eq. dec. ♂	☌ ♄ 10.19 P.M.
8	eq. dec. ♂	☿ 72° ♃	
9		☿ 36° ♄ et 150° ♆	
10			☌ ♃ 6.51 P.M. et □ ☉
11	□ ♃		[5.57 P.M.
12		♂ 36° ♓ et eq. dec. ♃	
13		♂ 45° ♆, ☿ 60° ♓, ☿ 30° ♄	extreme S. declination
14		☿ 45° ♄	
15			
16	135° ♆		
17		☿ eq. dec. ♄ et 60° ♃	☍ ☉ 1.36 P.M.
18	□ ♂		
19			on *Equator*.
20		☿ eq. dec. ♆	
21	60° ♓	☿ 72° ♃ et 150° ♆	
22		☿ 36° ♄	
23	45° ♄	☿ on *Equator*. ♂ 30° ♓. ☿	
24		☿ □ ♓ [72° ♓	☌ ♂ 1.56 A.M. et □ ☉
25	144° ♆	☿ eq. dec. ♆	ext. N. decli. [6.6 A.M.
26		♂ 135° ♄. ☿ 120° ♂	☌ ♓ 10.12 A.M.
27		☿ 30° ♄	
28			
29			
30		☿ eq. dec. ♄	
31	150° ♆	☿ 60° ♃	

Note.—The above aspects are calculated from the *data* given in the *Nautical Almanac*. To save our readers the time and trouble occupied in making the necessary calculations, we print the tables, as above, three months in advance, in *The Quarterly Weather-Guide**.

* (No. I, July 1st, 1864, price 3*d*., London, G. Berger, 12, Newcastle Street, Strand). This periodical also contains predictions of the weather.

2. The Solar aspects are first in importance. If the aspects of Jupiter and Mars preponderate, there will be but little rain, and the mean temperature will be *above* the average—especially if a 'mutual' aspect is also formed between those bodies.

3. If the aspects of Saturn, Uranus, Venus, and Mercury are most numerous, expect much downfall, and low temperature.

4. When the Sun aspects Mercury (by *conjunction*, or *equal declination*) expect *changes*, and strong wind. When Mercury forms an aspect with Saturn, or Uranus, within a few hours of the occurrence of the Solar aspect, expect gales or storms of wind. When the Solar aspect with Mercury is attended, in summer, by a 'mutual' aspect of Mercury with Jupiter or Mars, expect thunderstorms.

5. The period of time over which the influence of any Solar aspect will extend depends, in some measure, on the proximity of the Solar aspect immediately preceding or following. The new and full Moon* frequently accelerate or retard the effect, as the case may be. Mercury's aspects have a similar effect. The intervention of a *major* 'mutual' aspect will also affect the continuance or cessation of the influence of the foregoing Solar aspect.

6. '*Mutual*' aspects retain influence but for a few hours, unless one of the two planets aspects the Sun also.

7. When a *conjunction* of the Moon occurs with the planet in aspect to the Sun the effects are enhanced.

8. The crossing of the Earth's Equator by the Moon often effects a *change* in the weather, and so also does the passing of the tropics,—the northern tropic (*Cancer*) more especially.

9. When the Moon crosses the Equator or tropics at, or near, the time a Solar aspect with a planet is formed, expect, more or less, atmospheric disturbance.

Observation.—The above rules should be combined with those respecting barometric indications (vide *The Weather Book*, Chap. II), published by Admiral Fitz Roy.

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* As on the 9th of January, 1864, when the new Moon accelerated the transition from the influence of Saturn to that of Jupiter, resulting in a thaw, after a week's frost: *vide* p. 44.

Meteorological Table of the Sun.

SUN with	SPRING.	SUMMER.	AUTUMN.	WINTER.
Saturn . .	Cold rains, bleak winds, gloomy air	Hail, rain, thunder and heavy clouds	Cold rains and windy,—stormy air	Snow, rain, and storms
Jupiter . .	Windy & mild air, large clouds, generally N. W. winds	Thunder and heavy clouds, white, like woolpacks	Windy, yet warm air, N.W. winds, woolpack clouds	Mild air for the season
Mars. . . .	Dry and windy.—Warm air	Much thunder and lightning,—great heat	Dry and windy. Warm air	Warm for the season
Venus . . .	Moist air, and rainy	Thunder showers —smart rain	Drizzling rain—much wet	Mist, fog, and rain
Mercury .	Generally rain and wind; if retrograde, ever rain	Variable — generally showers	Variable — moist air—often rain and wind	Stormy— rain & wind mostly — sometimes frost

'Mutual' and Lunar Aspects.

Planets.	SPRING.	SUMMER.	AUTUMN.	WINTER.
Uranus and Saturn	Squalls and storms rain and cold air	Cloudy, turbulent air; dull and rainy	Clouds and cool air; showery and unsettled	Rain or snow; rough weather and sudden changes
Uranus and Jupiter	Changes frequent, mild weather	Fair and dry; thunder, &c.	Close air; heat and thunder, with hail storms	Unsettled, rain
Uranus and Mars.	Squalls of wind; sudden changes	Warm, close air, and thunder; dense clouds about	Hail and thunder frequent; hot air	Rude weather, unsettled and stormy
Uranus and the Sun	Cold bleak air; sudden changes; frosty	Cloudy, changeable; sudden sqalls of wind, hail, &c.	Cloudy; wild sky downfall	Stormy; sudden changes; cloudy; cold; hard frost or snow
Uranus and Venus.	Cloudy & showery, dull air; some sudden showers	Clouds & showers, hail, and some thunder	Rain and dull air; sudden changes	Rain or snow; gloomy and cold and fog
Uranus and Mercury	Windy and cloudy; sudden changes; frosty	Windy, squally; hail showers and lightning	Clouds and high winds; some squalls, with hail, &c.	High winds, and snow showers;
Saturn and Jupiter	Wind and rain	Rain and thunder	Wind and rain	Turbulent air
Saturn and Mars	Rain and thunder	Thunder and hail	Rain and storms	Increase of cold; rain
Saturn and the Moon	Clouds and moist air	Cooling rains	Cloudy weather	Clouds and snow
Saturn and Mercury	Wind and rain	Windy weather	Winds and clouds	Winds and snow

'Mutual' and Lunar Aspects continued.

Planets.	SPRING.	SUMMER.	AUTUMN.	WINTER.
Saturn and Venus	Cold rains	Sudden rains	Cold rains	Snow or rain
Jupiter and Mars	Turbulent weather; dry air	Heat and thunder	Winds, but warm	Warm air
Jupiter and the Moon	Genial showers & gentle gales; white clouds	Serene air and fine weather; white woolpack clouds	Calm and temperate, with white clouds	Mitigation of the season
Jupiter and Mercury	High winds	Winds and thunder	Windy, but moist air	Windy; sometimes rain, if Mercury aspect Saturn also
Jupiter and Venus	Fine growing weather	Bland and delightful air	Clear and serene air	Warmth, yet snow may fall
Mars and the Moon	Showers and hail	Thunder and heat; sometimes rain	Intemperate air and rain at times	Variable; some rain, generally
Mars and Venus	Abundant rains	Small rain prevails	Rainy weather	Rain or snow
Mars and Mercury	Rain and wind	Thunder and hail	Hail and winds	Snow or rain
TheMoon and Venus	Cloudy and moist	Mitigation of heat; cloudy	Cloudy and dark air	Winds and sleet or snow
Mercury and Venus	Pleasant showers and misty air	Cloudy and rainy, unless Mercury aspect Jupiter	Variable; misty air	Abundant rains; sometimes floods

ADDENDA.

Note to Chap. IV.

5th Period.—Mr. Allnatt's letter to the *Times* on the weather of May, 1864, contained the following paragraph:—

"From the 9th to the 16th, there were great disturbances of the atmosphere, electricity, flying scud, opposing currents, auroræ borealis, luminous cirri, heavy thunder clouds, and storms breaking over various parts of the country. . . . . The mean quantity of ozone for the eight days was nearly at its *maximum*—viz. 9.9 deg."

Bolide of May 14th.—At Nérac, on this date, a very luminous bolide was seen in the evening, and four or five minutes after its passage a powerful detonation was heard, accompanied by a rumbling like thunder. At St. Clar the light was so brilliant at 8h. 13m. as to give rise to the idea that the village was in flames, and the meteor looked nearly as big as the full Moon. It left a train behind it, which gradually disappeared, and in the course of ten minutes a noise was heard like the discharge of cannon.—*Intellectual Observer*, July 1864.

Note to Chap. VI.

8th Period.—Sun 90° from Saturn, July 3rd, 1864:—

"At the Royal Observatory, Greenwich, the mean height of the barometer in the week," ending July 9th, 1864, "was 29·881 in. On Sunday," the 3rd inst. "the reading was 29·47 in., and rose to 30·02 in. on Wednesday. The mean temperature of the air in the week was 56·5 deg., which is 5·1 deg. *below* the average of the same week in 43 years. The mean daily temperature was below the average throughout the week. . . . . The

amount of rain was 0·13 in., which fell on Sunday, accompanied with thunder."—*Times*, July 13, 1864.

According to Admiral Fitz Roy's "Meteorological Reports" of Monday, July 4th, 1864, 8 A.M. severe gales had been raging "since last report" at Cape Clear, Queenstown, Holyhead, Penzance, Plymouth, Portsmouth, London, and Heligoland. The total amount of rain-fall at 19 stations = 6·17 inches.

Thus was fulfilled our prediction in No. 1 of the QUARTERLY WEATHER GUIDE:—"July, 1864, the weather of the first seven days will be very unsettled—cold rains, and strong wind on the 3rd inst."

NOTE TO CHAP. VII AND VIII.

July 17th, 1864, Sun in conjunction with Mercury, and Mercury in conjunction with Venus. July 18th, Sun in conjunction with Venus.

The weather in London on the 17th inst. was misty until noon. At $6^h\ 30^m$ P.M. (at Kensington) dashing rain, thunder and lightning. A "terrific thunderstorm" at Warminster, in Wiltshire, where "rain fell in a deluge; and some idea of the state of things may be realized, when it is stated, that the principal streets were in a few minutes some fourteen or fifteen inches under water, and the lower portions of the houses inundated" (*Daily Telegraph*, July 19th, 1864).

The Paris correspondent of the *Times* stated, that on Sunday, the 17th inst.;—"at half past 3 P.M., there was a violent thunderstorm, with hail and rain that came down like a torrent, and, in a few minutes, flooded the streets. In about an hour it cleared up a little, but began again with renewed violence, and lasted a good part of the evening. One thunder clap was tremendous, and there was not a second between it and the flash. This last storm, which lasted nearly an hour, cooled the air considerably."

At Plymouth 0·73 in. of rain was registered at 8^h A.M., Monday,

July 18th. Our prediction in the QUARTERLY WEATHER GUIDE was as follows:—"The Solar conjunctions of Mercury and Venus on the 17th and 18th, will bring changes, and, probably, *heavy rains.*"

ERRATA.

Page 51, 9th line, *read* were *for* was.
„ 54, 2nd line, *read* February *for* Febuary.
Ibid, 14th line, *read* February *for* Febraury.
Page 115, 24th line, *read* phenomenon *for* phenomena.